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AN INVESTIGATION OF INTELLECTUAL CAPITAL INFLUENCE ON FINANCIAL PERFORMANCE OF TOP SERBIAN EXPORTERS*

Istraživanje uticaja intelektualnog kapitala na
finansijske performanse najvećih srpskih izvoznika

Abstract

Although intellectual capital (IC) is the key issue in achieving and sustaining competitiveness in the long run, the literature is limited in offering empirical data on whether IC affects export performance of the firm. This paper explores the impact of IC, measured using the Value Added Intellectual Coefficient (VAIC), on financial performance, as well as on export performance of 300 Serbian top performing companies in terms of export. The research entailed the analysis of the impact of individual VAIC components on financial performance. Scientific hypotheses are developed according to similar studies on IC and financial performance. Performance measures used in this research are divided into two categories. The first group consists of export-related indicators, such as export volume, and export volume per employee. The second group is made up of traditional measures of corporate performance (return on equity, return on assets, profitability, and employee productivity). Data is analyzed using statistical methods of correlation and multiple regressions. Multiple-regression models are employed to determine the relationship between individual components of VAIC and identified measures of performance. The majority of similar studies have shown so far that IC has a significant impact on financial performance. However, in the case of top Serbian exporters, the significant impact of IC on financial performance was not determined.

Key words: *intellectual capital, intangible assets, export performance, financial performance*

Sažetak

I pored činjenice da intelektualni kapital predstavlja ključno pitanje u postizanju i održavanju konkurentnosti na dugi rok, u literaturi još uvek nema dovoljno empirijskih dokaza o uticaju IK na izvozne performanse preduzeća. U radu se istražuje uticaj intelektualnog kapitala, merenog uz po-

moć koeficijenta dodatne vrednosti intelektualnog kapitala (engl. Value Added Intellectual Coefficient, VAIC), na finansijske performanse 300 najvećih srpskih izvoznika. Istraživanje je podrazumevalo analizu uticaja pojedinih komponenti koeficijenta VAIC na finansijske performanse pomenutih preduzeća. Istraživačke hipoteze su definisane u skladu sa sličnim studijama koje su se bavile uticajem IK na finansijske performanse. Merila performansi koja su korišćena u ovom istraživanju su podeljena u dve kategorije. Prva grupa se sastoji od indikatora povezanih sa izvoznim performansama, kao što su obim izvoza i obim izvoza po zaposlenom. Druga grupa je sastavljena od tradicionalnih merila performansi (prinos na kapital, prinos na aktivu, profitabilnost i produktivnost zaposlenih). Podaci su analizirani pomoću statističkih metoda korelacije i višestruke regresije. Modeli višestruke regresije su korišćeni sa ciljem utvrđivanja prirode odnosa između pojedinačnih komponenti VAIC i identifikovanih merila performansi. Većina sličnih studija ukazuje na činjenicu da IK ima značajan uticaj na finansijske performanse. Međutim, u slučaju srpskih najvećih izvoznika značajan uticaj IK na finansijske performanse nije dokazan.

Ključne reči: *intelektualni kapital, nematerijalna aktiva, izvozne performanse, finansijske performanse*

Introduction

Business performance is measured by tangible outcomes, which are the result of different undertaken actions. In addition, business represents the sum of various resources, skills, and competencies, which are driven by activities specified within chosen strategy. Hence, resources are therefore a key factor in the process of strategy formulation and execution. The problem is, however, that employed resources, which are exploited during strategy execution, cannot create value independently. They create competitiveness and value only if they are supported by

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adequate capabilities in organization. Capabilities make resource-based value creation possible; they are often intangible and interpreted as knowledge, information, skills, customer relations, customer loyalty, organizational capabilities, networks, corporate culture, and image.

A knowledge-based economy has one important prerequisite for corporate success: the efficient and effective use of intangible resources in terms of achieving sustainable competitive advantage. In other words, in business models imposed by the information age, intangibles create more value than tangible resources do [17]. Also, the importance and potential of IC as the factor of competitive advantage is unquestionable. Developed market economies base their competitiveness on knowledge, information, commercial innovativeness, corporate strategies, and the sophistication of their business models, and far less on natural resources and cheap labor [18]. In analyzing IC and its impact on financial performance of companies operating in information-age, one must take into account the nature and elements of intangibles, the possibility of measuring intangibles, and their relation to value creation.

According to Hall [16], intangible assets are modern value drivers, which productively transform resources into tangible assets with added value. Lev [23] defines intangibles as resources that will lead to future benefits for the company. He denotes that intangibles consist of the existing knowledge in an organization that is used to create differential advantage. Stewart [31] sees IC as a “collective brainpower” of a company, which includes knowledge, information, intellectual property, and expertise used in the process of value creation. Funk [13] links intangibles to management’s credibility, innovation potential, identified brand, ability to attract talented individuals, research

leadership, social responsibility and attitude towards environment. Sullivan [32] defines IC as knowledge that can be transformed into profit. Different definitions of IC have one thing in common, and that is the fact that intangibles represent type of assets in a company, which possess the highest potential for future value creation [9, p. 572].

In addition, to fully understand the nature of intangibles, it is important to review their consisting elements. The most widely used classification of IC divides it into three categories [1], [25], [33]: human, structural, and relational capital. Human capital comprises the knowledge and skills of employees, their talents, creativity, enthusiasm, and ability to learn. Structural capital entails components of internal corporate structure: corporate culture, trademarks, patents, software, copyrights, databases, and management processes. Relational capital refers to the numerous relations made with external stakeholders of a company (investors, customers, suppliers, creditors). Examples of relational capital include brands, reputation, customer relations, cooperation with partners, licenses, and distribution channels [19]. The approach that summarizes different categorizations of IC is given in Table 1.

In terms of different measurements that can be used, some researchers define IC as the positive difference between the market value of the company and book value of its net assets [3], [6]. However, this positive difference cannot always be linked to the effects of intangibles on corporate performance. The main disadvantage of this measure, i.e. seeing intangibles as this positive difference, is that it doesn’t take into account the fact that market noise might influence the market value of shares and thus the value of intangibles [10]. This implies that further research is needed into the ways in which IC can be measured, as

Table 1: Components of IC

Human capital	Structural capital	Relational capital
- Knowledge and skills	- Corporate culture	- Brand
- Trainings	- Management process	- Market reputation
- Creativity	- ICT systems	- Customer relations
- Ability to learn	- Corporate strategy and plans	- Communication with existing and new customers
- Responsibility, individualism, dedication	- Internal databases	- Ability to appeal to new customers
- Enthusiasm and level of motivation	- Software	- Business networks
- Flexibility and adaptability	- Patents, licenses, authorship rights	- Sales channels
- Attitudes (toward life, family, career, etc.)	- Franchises	- License agreements

Source: [18]

well as its impact on corporate performance in knowledge-based economies. A number of good attempts have been made in the past two decades to identify a suitable IC measurement model to describe its structure, nature, and effects on corporate performance.

In terms of growth strategies, companies tend to undertake expansion of business operations by searching beyond their domestic markets. These companies tend to focus on high-growth export markets in order to ensure survival and growth. This is why export performance of companies gains much attention while analyzing overall corporate performance [30]. The value of export of goods and service as a percentage of GDP is increasing in European Union during last 50 years. The same situation is also with OECD member states. Comparing these data with the data for Serbia during the same period, we see that export performance in Serbia was going through ups and downs. Unfortunately, the export performance from 1993 till 2011 shows steady decrease, which is why the question regarding export performance analysis should be taken into consideration in order to determine the main drivers of this business activity in Serbia (see Figure 1).

The paper is structured logically and according to the nature of the research. In the first part (Literature review) the paper deals with three major issues. Firstly, attempts to measure the effectiveness of the use of IC in a company are presented. Afterwards, it is logical to continue with exploring the ways in which export performance can be observed and measured. Finally, the authors present the latest empirical

studies regarding the issues of relationship between IC and corporate performance of companies. In the second part of the paper (Research methodology) authors focus on presenting the conceptual framework of the research, thus including research objectives and development of hypotheses, definition of variables that are used in the research, and ultimately, data sources and sample description are presented. In the third part, the authors present empirical findings. Finally, there are adequate conclusions, limitations and directions for future research studies in the field.

Literature review

As noted previously, the literature is rich with different approaches to defining, categorization, and measurement of IC within a company. In addition, there are numerous empirical analyses performed in terms of studying impact of intangibles on corporate and market performance of companies. Few research studies stand out regarding this matter, and the structure of this segment of the paper will be adjusted accordingly. Firstly, the paper will briefly present the methods for measuring intangibles' efficient and effective use. Secondly, the paper will identify different approaches to effective measuring of export performance of companies. Thirdly, we will focus on research studies carried out in similar economies, which deal with relationship between IC's exploitation and corporate performance focusing on the influence of various components of IC on export performance.

Figure 1: Export value as percentage of GDP

Source: Authors' calculation according to the data from World Bank [37]

Measuring IC

Many attempts have also been made to find a useful model for measuring the size and impact of IC on overall company performance. One early effort in this area can be seen in the work of Edvinsson [11], who developed a model for measuring IC, known as the Skandia Navigator. Methods for measuring IC can be categorized into four large groups, according to Sveiby [34]: 1) market capitalization methods; 2) direct measurement methods; 3) scorecard approaches; 4) economic value-added approaches. However, the Value Added Intellectual Coefficient (VAIC) method, used in this paper, does not fit into any of the above groups, so Chan [2] has labeled it as a fifth approach to measurement of IC [22].

The approach used in the analysis of effective use of IC within Serbian high performing exporting companies was introduced and implemented by Ante Pulic from the Austrian IC Research Center [27], [28]. This approach uses VAIC as a measure of a company's efficiency in exploitation of IC. The VAIC model is based on the notion that human or knowledge potential positively influences corporate performance and success. In the context of Pulic's model, the starting point is assessment of the value added (VA) achieved by a company. VA is calculated as a difference between total revenues (OUT) and total expenses (IN), except for those related to human resources, which are viewed as an investment, not a cost in terms of this approach. The ultimate goal is to determine the individual contribution of all elements of IC to the creation of VA. Calculation of VAIC thus is implemented through following equations:

- (1) $VA = OUT - IN$
- (2) $HCE = VA/HC$
- (3) $SCE = SC/VA$
- (4) $ICE = HCE + SCE$
- (5) $CEE = VA/CE$
- (6) $VAIC = ICE + CEE$

A company's IC consists of human and structural capital. Calculation of human capital efficiency (HCE) starts with employees' salaries and wages during one fiscal year. HCE is calculated according to equation (2), where human capital, denoted as HC, includes total salaries and wages. In this way, the model highlights the relative contribution of human resources to creation of VA. The next component of intangibles, structural capital,

includes hardware, software, organizational structure, patents, trademarks, and all other factors that support or increase employee productivity (EP). Thus, structural capital efficiency (SCE) is calculated as presented in equation (3), where SC stands for structural capital. This equation indicates that SCE is inversely related to HCE. Intellectual capital efficiency (ICE) is obtained by summing the partial efficiencies of human and structural capital, as described by equation (4). Finally, the physical capital component, or capital employed efficiency (CEE), is derived from the ratio of VA to a company's net assets (equation (5)). Here, capital employed (CE) is the capital already invested in a company. In order to enable a comparison of overall value-creation efficiency, the two indicators need to be summed (equation (6)). This aggregated indicator allows us to understand a company's overall efficiency and indicates its ability to create value by using IC. Put simply, VAIC measures how much new value has been created per invested monetary unit.

Measuring export performance

During past decades, a significant number of research studies have been carried out on topic of examining export performance of companies. This serves as the proof of growing importance of this field of research. However, despite the fact that there are many empirical studies in this area, the conclusions from these research studies are often fragmented and contradictory. The main reason for this is lack of unique measure for ranking export performance of companies. In other words, authors fail to agree on the way in which to conceptualize and implement various export performance measures. Mostly, authors made different export measuring schemes, based on different performance dimensions [7]. Since measuring export performance was often labeled as least understood area of international marketing, Sousa [30] performed a broad empirical analysis of approaches that exist in the field of measuring export performance of companies. The author collected the data from 43 different research studies and analyzed the export performance measures used. All the methods were categorized as objective, subjective, general, and miscellaneous. Export performance indicators that are mainly based on absolute values, such as export

intensity, export sales volume, export market share, and alike, are labeled as objective measures. On the other hand, indicators that use perceptual or attitudinal performance like perceived export success or satisfaction with export sales are considered to be subjective.

Objective measures of export performance include 1) absolute measures of export performance (export intensity, export intensity growth, export sales growth, export sales volume, and export sales efficiency); 2) profit-related measures (export profitability, export profit margin, and export profit margin growth); and 3) market-related measures (export market share, export market share growth, and market diversification). On the other side, there are subjective measures of export performance, which are often used when managers are unwilling or unable to provide objective financial data or because of the difficulty in reconciling cross-national or cross-industrial differences in accounting practices, variations in exchange rates, and financial reporting between home and host countries [38]. Besides these two main categories, there are indicators marked as *general measures*. These include managers' degree of satisfaction with overall export performance, overall export performance compared to competitors, export success, meeting expectations, how competitors rate firm's export performance, and strategic export performance. Finally, several *miscellaneous* measures were used across analyzed studies. These are contribution of exporting to the quality of firm's management, quality of distributor relationships, customer satisfaction, and reputation of the firm compared to competitors, among others [30].

IC and corporate performance

The relationship between appropriate use of IC and various indicators of corporate performance has been widely studied in the literature. For the purposes of the present research, we will focus on studies carried out in similar economies to Serbia's as well as on studies analyzing the impact of intangibles on export performance.

Firer and Williams [12] conducted research on a sample made up of 75 companies listed on the Johannesburg Stock Exchange. This study is particularly interesting since the economy of South Africa was, at the time (2003), in the same stage of transition that the Serbian economy is

experiencing today. The results revealed that in general, empirical findings suggest that despite efforts to improve its intellectual capital base the business environment and market in South Africa still appears to place greater weight to corporate performance based on physical capital assets. An interesting study performed by Goh [14] presented the efficiency of intangibles' use in domestic and foreign banks in Malaysian territory. This research found that domestic banks were generally less efficient at exploitation of IC. A similar study [29] was conducted on Egyptian software companies to analyze how intangibles affected the organizational performance of selected companies. The results confirmed positive correlation between human capital indicators and firm performance.

On the other hand, the studies carried out in Serbia regarding the impact of IC on firm performance are very scarce. However, there are a couple of research studies stressing out this issue for different types of samples. A study carried out within Serbian industrial (real) sector, analyzing one hundred of Serbian most profitable companies in 2010 [18] revealed that net profit did not depend on HCE, SCE, and CEE and thus was not the consequence of the efficient use of IC. The situation is similar when operating revenue and operating profit and their relationship with VAIC were analyzed. However, the research revealed that human capital and physical capital influenced return on equity, with physical capital more influential than human. On the other hand, return on assets was mainly determined by structural component of VAIC. An extent to the mentioned study, a survey was implemented again among most profitable Serbian companies in 2011 [21]. The empirical study revealed that that corporate performance was primarily affected by physical capital and in small proportion by structural capital. This serves as the proof that Serbian companies are still using the business model that promotes relying on physical, instead on IC. In addition, a study was undertaken among Serbian companies labeled as top performing in terms of market indicators. The research was aimed at discovering the relationship between IC and corporate performance among firms that make up the so-called Belex15 index. This study also failed to confirm the existence of a strong positive correlation between VAIC and corporate

performance [19]. Finally, when analyzing the practices regarding usage of IC in last several years in Serbia [20], it was confirmed by the analysis of median values over the four-year period (2007-2010), that Serbian companies are increasingly reliant on IC. However, when analyzing different industries, the study failed to prove significant difference among industries in terms of sources of value creation. In other words, there is no industry that relies more on intangibles than the other. Final conclusion made by the mentioned study was the fact that, although there was no significant impact of intangibles on corporate performance, companies with higher values for VAIC tend to have better corporate performance.

The relation between IC and export performance was given special attention as well. A study implemented among 388 firms from Florida [15] revealed that the manner in which human resources strategy is implemented plays a significant role in subsequent export performance. Mavridis [24] analyzed the difference in business models between Greek localized firms and globalized ones. The study pointed to the conclusion that that localized firms are the distinct small technocratic, blue-collar intellectual performers while the globalized ones are the large plutocratic, white-collar intellectual performers. The more recent research undertaken by Pucar [26] showed that there was positive influence of VAIC and its components on the export growth in the sector of food and beverages and manufacturing of furniture and wood products in Bosnia and Herzegovina. However, for other sectors there is no significant relation between IC and corporate performance.

Research methodology

Research objectives and hypotheses

The research had two main objectives. The first was to determine whether IC affects export performance among Serbian top 300 exporters during 2011. In order to examine whether export volume and export volume per employee are affected by IC, we chose the elements of VAIC as independent variables. These variables are human capital efficiency, structural capital efficiency, and capital employed efficiency. Bearing this in mind we define the first two hypotheses:

H1. Companies with greater value for VAIC tend to have higher export volume

H2. Companies with greater value for VAIC tend to have higher value for export volume per employee

The second objective of the proposed research model was to investigate whether top exporting companies base their competitiveness on foreign markets on intangible or tangible resources. In order to determine this, we examined the relationship between volume of IC existing in the company and the corporate performance.

The components of VAIC will again serve as independent variables. In this regard, we formulated the following hypotheses:

H3. Companies with greater value for VAIC tend to have higher ROE

H4. Companies with greater value for VAIC tend to have higher ROA

H5. Companies with greater value for VAIC tend to have higher profitability level

H6. Companies with greater value for VAIC tend to have higher EP

Defined research hypotheses were tested through statistical analysis, which included analysis of descriptives, correlation analysis, as well as multiple regression analysis. The gathered data were processed by IBM SPSS Statistics 20 software.

Definition of variables

The proposed model includes dependent and independent variables. The chosen dependent variables for the defined research objective are return on equity (ROE), return on assets (ROA), profitability, and employee productivity (EP). These variables will act as dependent ones. These dependent variables are calculated as follows:

- ROE: net profit divided by the book value of average stockholders' equity
- ROA: the ratio of pre-tax income to the company's total assets
- Profitability: the ratio between operating profit and operating revenues
- EP: the ratio of pre-tax income to total number of employees.

Independent variables used are components of VAIC,

described previously in the part of the paper entitled Measuring IC. For the purposes of accomplishing the second goal of the research, we chose suitable measures of export performance for the presented model in the form of export volume and the ratio export volume per employee. These two indicators will serve as two extra dependent variables in the research.

Data sources and sample description

The sample consists of 300 companies with the highest absolute level of export during 2011. Data source for external trade statistics is the Single Administrative Document on exports and imports of goods obtained from Chamber of Commerce and Industry of Serbia [35]. The data were gathered through detailed analysis of official financial reports published through web site of Agency for business registers [36], and through detailed analysis of these reports performed by the authors.

The companies that make up the defined sample are of the various legal forms and sizes. The Serbian top exporting performers achieved significant contribution to overall business activity in Serbia. Serbian top exporting performers significantly affect the overall employment rate. Out of total of 1,173,000 employed in Serbia, top 300 exporting companies make up 12.46% (146,149). The top ten exporters employ 14.57% of total number of workers hired by these 300 companies. In addition, the top ten exporters realized 18.53% out of all sales achieved by the top 300 exporters during 2011.

During 2011, the total value of all exported goods and

services was 8,081.4 million Euros, while the value of export of 300 top performing exporters makes up 79% of this. In terms of net profit, the top exporting performers realized net profit in the amount of 10.99% of total realized value of net profits of all business subjects in Republic of Serbia during 2011. The average value for return on assets (ROA) of 300 top exporting companies in Serbia is 4.59%, while the average ROA for the whole Serbian economy in 2011 was 2.1%. Among top 300 top performing exporters, 80% realized positive net profit in 2011, while 20% were either at zero level in terms of net profit, or achieved net loss. In terms of financial performance, only two companies that are among top ten exporters in 2011 are among top ten companies in terms of realized net profit in the same year. Furthermore, only three companies from top ten exporting group are among top thirty firms ranked according to net profit. This implies that top Serbian exporting companies are not necessary among the best ones when it comes to net profit, and vice versa. In addition, two biggest exporting companies in 2011 realized heavy losses in the same year.

Empirical findings

Descriptive statistics

The initial statistical test performed on the defined sample assesses the normal distribution of data within the sample. The objective here is to determine the nature of the data and to select an appropriate type of correlation analysis.

Kolmogorov–Smirnov and Shapiro–Wilk tests of normality (see Table 2) clearly suggest none of the analyzed

Table 2: Tests of normality for observed variables

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
<i>Dependent variables</i>						
Export volume	.282	243	.000	.549	243	.000
Export volume per employee	.426	243	.000	.128	243	.000
ROE	.420	243	.000	.110	243	.000
ROA	.166	243	.000	.793	243	.000
Profitability	.399	243	.000	.147	243	.000
EP	.281	243	.000	.464	243	.000
<i>Independent variables</i>						
HCE	.299	243	.000	.403	243	.000
SCE	.290	243	.000	.368	243	.000
CEE	.372	243	.000	.178	243	.000

a. Lilliefors Significance Correction

variables has normal distribution of data. This indicates that the analysis requires non-parametric statistical tests. This implies that it is necessary to apply Spearman's correlation analysis in the next step.

Table 3 presents the values of descriptive statistics for the sample analyzed within this research. The descriptive statistics presented entail minimum and maximum values, mean values, standard deviation, and variance.

Correlation analysis

Table 4 presents the results of correlation analysis using Spearman's coefficient of correlation, for data without a normal distribution. Values for the correlation coefficient are interpreted according to Cohen [5]. The results indicate that there is weak correlation between export volume and

physical capital invested (0.166). On the other hand, export volume per employee expresses significant moderate positive correlation with human and structural capital, but only weak with physical capital. ROE positively correlates with all elements of VAIC. Specifically, there is strong positive correlation with human and structural capital, and weak correlation with physical capital employed. Similarly, ROA has strong positive correlation with HCE, moderate correlation with SCE, and weak one with CEE. Productivity strongly correlates with all components of VAIC. Finally, employee productivity strongly correlates with human and structural capital, while there is weak correlation with physical capital.

In order to examine the nature of relationships between the dependent and independent variables, the

Table 3: Descriptive analysis

Descriptive Statistics						
2011	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Export volume	300	4644494.48	652110263.54	22222937.99	47898532.93	2294269457208125.00
Export volume per employee	300	0.00	17757632.53	287761.17	1188582.07	1412727334373.35
ROE	276	-36.08	2.42	0.002	2.23	4.98
ROA	293	-0.58	0.93	0.046	0.12	0.01
Profitability	276	-32.31	4.27	0.09	2.04	4.16
EP	299	-99178.22	451866.02	9798.44	38653.35	1494081379.78
HCE	258	-55.08	23.63	2.52	4.49	20.12
SCE	259	-2.37	11.83	0.49	0.86	0.75
CEE	275	-0.14	54.84	1.01	3.64	13.27
Valid N (list wise)	243					

Table 4: Correlation analysis

		HCE	SCE	CEE
Export volume	Correlation Coefficient	.095	.098	.166**
	Sig. (2-tailed)	.126	.114	.006
	N	258	259	275
Export volume per employee	Correlation Coefficient	.403**	.353**	-.128*
	Sig. (2-tailed)	.000	.000	.034
	N	258	259	275
ROE	Correlation Coefficient	.608**	.542**	.133*
	Sig. (2-tailed)	.000	.000	.027
	N	243	244	275
ROA	Correlation Coefficient	.619**	.469**	.292**
	Sig. (2-tailed)	.000	.000	.000
	N	258	259	275
Profitability	Correlation Coefficient	.660**	.597**	.640**
	Sig. (2-tailed)	.000	.000	.000
	N	243	244	275
EP	Correlation Coefficient	.804**	.649**	.188**
	Sig. (2-tailed)	.000	.000	.002
	N	258	259	275

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed)*

next section of the paper presents the results of multiple-regression analysis. The conclusions that will be drawn from regression analysis will significantly alter the ones made from correlation analysis.

Regression analysis

The multiple-regression model used in this study has, as dependent variables, export volume, export volume per employee, ROE, ROA, profitability, and EP, while the independent variables are components of VAIC, which are HCE, SCE, and CEE. The research model includes six regression models whose primary goal is to examine the nature of the relationships between selected indicators of performance and IC.

Regression model 1:

Independent variable – export volume

When observing regression model no. 1 (see Table 5 and Table 6), which has export volume as independent variable, there are several important remarks that need

to be pointed out. The model has poor quality in terms of fit, since the value for R squared is only 0.002. This implies that the changes in VAIC can only explain 0.2% of changes in the export volume. In addition, none of the components of VAIC significantly affects export volume.

Regression model 2:

Independent variable – export volume per employee

Similar conclusions can be made when analyzing second regression model, with export volume per employee as dependent variable (see Table 7 and Table 8). Model fit is poor (R square is only 1.5%), while there is also lack of influence of intangibles on export volume per employee. The factor with the closest level of impact is human capital component with the level of significance of 0.095 and beta with 0.108 values. The general conclusion regarding the impact of IC on export performance is that it does not exist. This serves to prove that export performance depends on other factors, different from VAIC components.

Table 5: Assessing the model fit

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.046	.002	-.010	29061982.92011
a. Predictors: (Constant), CEE, HCE, SCE				

Table 6: Summary of the regression model no. 1

Coefficients								
Model	B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	
		Std. Error	Beta				VIF	
1	(Constant)	20643360.196	2473693.113		8.345	.000		
	HCE	197295.935	410261.038	.031	.481	.631	.992	1.008
	SCE	635090.328	2205344.068	.019	.288	.774	.985	1.015
	CEE	-173678.839	486542.746	-.023	-.357	.721	.991	1.009
a. Dependent Variable: Export volume								

Table 7: Assessing the model fit

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.121	.015	.002	1193493.9562239
a. Predictors: (Constant), CEE, HCE, SCE				

Table 8: Summary of the regression model no. 2

Coefficients								
Model	B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	
		Std. Error	Beta				VIF	
1	(Constant)	109718.792	101587.624		1.080	.281		
	HCE	28201.012	16848.268	.108	1.674	.095	.992	1.008
	SCE	62236.144	90567.282	.044	.687	.493	.985	1.015
	CEE	6123.656	19980.943	.020	.306	.760	.991	1.009
a. Dependent Variable: Export volume per employee								

Regression model 3: Independent variable – ROE

When analyzing the corporate performance of top Serbian exporters, measured by ROE, the situation is changing (see Table 9 and Table 10). The model fit is better compared to first two regression models, since R square is 7.4%, meaning that ROE changes could be explained by changes in applying IC in 7.4% of cases. In addition, there

is significant impact of structural and capital employed efficiency on ROE during 2011.

Regression model 4: Independent variable – ROA

The fourth regression model reveals that changes in values of ROA are caused in 8.8% of cases by alterations in values of VAIC. When examining the nature of these

Table 9: Assessing the model fit

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.272	.074	.062	2.2959961

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

Table 10: Summary of the regression model no. 3

Coefficients								
Model B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	Collinearity Statistics	
	Std. Error	Beta					VIF	
1	(Constant)	-.221	.195		-1.129	.260		
	HCE	.023	.032	.045	.717	.474	.992	1.008
	SCE	.492	.174	.177	2.825	.005	.985	1.015
	CEE	-.111	.038	-.181	-2.898	.004	.991	1.009

a. Dependent Variable: ROE

Table 11: Assessing the model fit

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.296	.088	.076	.1116150

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

Table 12: Summary of the regression model no. 4

Coefficients								
Model B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	Collinearity Statistics	
	Std. Error	Beta					VIF	
1	(Constant)	.037	.010		3.932	.000		
	HCE	.006	.002	.222	3.573	.000	.992	1.008
	SCE	.023	.008	.169	2.708	.007	.985	1.015
	CEE	-.001	.002	-.043	-.693	.489	.991	1.009

a. Dependent Variable: ROA

Table 13: Assessing the model fit

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.224	.050	.038	2.1150595

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

Table 14: Summary of the regression model no. 5

Coefficients ^a								
Model B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	Collinearity Statistics	
	Std. Error	Beta					VIF	
1	(Constant)	-.082	.180		-.458	.648		
	HCE	.032	.030	.068	1.074	.284	.992	1.008
	SCE	.351	.160	.139	2.184	.030	.985	1.015
	CEE	-.080	.035	-.143	-2.252	.025	.991	1.009

a. Dependent Variable: Profitability

relationships (see Table 11 and Table 12), we can see that ROA depends significantly on human and structural capital component. In other words, knowledge, skills, enthusiasm, organizational structure, databases, and so on, primarily affect return on total assets of Serbian top 300 exporters.

Regression model 5: Independent variable – profitability

Given that R square for regression model no. 5 has the value of 0.05, we can say that the model has poor quality. However, there is significant impact of structural capital and physical capital on profitability (see Table 13 and Table 14). This impact is statistically significant, but due to the low model fit, in practice this relation does not possess practical value.

Regression model 6: Independent variable – EP

The regression model with the best quality so far is the last one, examining the nature of relationship between employee productivity and components of VAIC (see Table 15 and Table 16). The changes in the value of employee productivity can be explained by changes in managing intangibles, measured by VAIC, in 13.3% of cases. Furthermore, human capital possesses significant influence on employee productivity, while structural capital is close to significant level (sig. = 0.065). Physical capital does not affect the level of employee productivity at top Serbian exporters. Finally, findings confirming the research hypotheses can be summarized as in Table 17.

Table 15: Assessing the model fit

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.365	.133	.122	38887.0795514
a. Predictors: (Constant), CEE, HCE, SCE				

Table 16: Summary of the regression model no. 6

Coefficients								
Model B		Unstandardized Coefficients		Standardized Coefficients	t	Sig. Tolerance	Collinearity Statistics	
		Std. Error	Beta				VIF	
1	(Constant)	2551.394	3309.984		.771	.442		
	HCE	3056.428	548.960	.337	5.568	.000	.992	1.008
	SCE	5461.905	2950.913	.112	1.851	.065	.985	1.015
	CEE	-127.733	651.030	-.012	-.196	.845	.991	1.009
a. Dependent Variable: EP								

Table 17: Confirmation of research hypotheses

Independent variable	Dependent variable	R ²	β	Level of significance	Hypothesis	Hypothesis confirmed
HCE	Export volume	0.002	0.031	0.631	H1	NO
	Export per employee	0.015	0.108	0.095	H2	NO
	ROE	0.074	0.045	0.474	H3	NO
	ROA	0.088	0.222	0.000	H4	YES
	Profitability	0.050	0.068	0.284	H5	NO
	EP	0.133	0.337	0.000	H6	YES
SCE	Export volume	0.002	0.019	0.774	H1	NO
	Export per employee	0.015	0.044	0.493	H2	NO
	ROE	0.074	0.177	0.005	H3	YES
	ROA	0.088	0.169	0.007	H4	YES
	Profitability	0.050	0.139	0.030	H5	YES
	EP	0.133	0.112	0.845	H6	NO
CEE	Export volume	0.002	-0.023	0.721	H1	NO
	Export per employee	0.015	0.020	0.760	H2	NO
	ROE	0.074	-0.181	0.004	H3	YES
	ROA	0.088	-0.043	0.489	H4	NO
	Profitability	0.050	-0.143	0.025	H5	YES
	EP	0.133	-0.012	0.845	H6	NO

Conclusion and limitations

During industrial age, economists described the basic resources necessary for industrial firm in terms of three classic types of assets: land, labor, and capital (here capital stands for financial and other economic assets). The idea of intellectual capital was a new one, since it emphasizes the brainpower assets of an organization, recognizing them as important as traditional land, labor, and tangible assets [32]. Since the 1990s, the issue of intellectual capital has gained much academic and professional attention, and in knowledge-based economy, intangibles are the pillar stones of sustainable competitive advantage. The rules of the game are changing in times of global economic crisis, but intellectual capital still represents the only valid way in which to regain strength of national economies. Serbia was already in a transitional recession when it entered global economic crisis of 2008. The global and domestic crises, caused by structural imbalances before and during the transition, multiply each other's negative effects. This is why companies find themselves exposed to increasing systemic risk [9]. In order to cope with the current situation the real sector of economy must focus and rely on resources that have the potential for creating and sustaining value in the long run. The main driving force must be intellectual capital.

Unfortunately, the results of this empirical study fail at confirming that Serbian top performing exporters create competitive advantage on intellectual capital management. For the purposes of this paper, we examined the impact of each component of Value Added Intellectual Coefficient in order to see which component has prevailing influence on exporters' financial performance. Specifically, we observed financial performance through two separate types of indicators. The first group of measures consists of performance indicators based on export volume. Here, we analyzed absolute volume of export and export volume per employee. The results of the study failed to confirm that export volume and export volume per employee were under the influence of any of the VAIC components. The closest impact to significant is the impact of human capital efficiency on export volume per employee.

In the case of the second group of performance indicators, they consist of traditional measures of corporate performance. We observed the impact of VAIC components on return on equity, return on assets, profitability, and employee productivity. However, we must take into account a few drawbacks of VAIC. The most significant one is that VAIC is calculated using companies' financial statements, which implies that the coefficient is a measure of value created in the past and not that of value-creation potential. Another criticism is that VAIC highlights the contribution of each component of IC to value creation and cannot include synergistic effects of its components. In addition, the model fails to offer an adequate analysis of the creation of VA for those companies that have negative values for equity and operating profit [4].

The study confirmed that return on assets is under significant impact of human capital component, as well as structural capital segment of VAIC. Human capital also influences employee productivity. In addition, structural capital significantly determines the values of return on assets and profitability, while capital employed efficiency affects return on equity and profitability. The main limitation of these results is the quality of all of the regression models in question. Model fit, measured by R square, ranges from 13.3%, in case of relationship between HCE and EP, to 5% in case of examining the impact of CEE on profitability. This is why only two companies that are among top ten exporters in 2011 are among top ten companies in terms of realized net profit in the same year, while only three companies from top ten exporting group are among top thirty firms ranked according to net profit. This leads to the general conclusion that the impact of intellectual capital on financial performance of Serbian top 300 exporters is extremely weak and vague at the present time. Partially, this conclusion can be attributed to the limitations of the VAIC methodology itself, but the main problem lies in economy's underestimating the importance of appropriate exploitation of existing level of intellectual capital, as well as neglecting the necessity to invest in it in the future.

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