COMPARATIVE ANALYSIS OF VALUE ADDED INTELLECTUAL CAPITAL AT SMALL AND MEDIUM ENTERPRISES

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Abstract: *Today, rapid and unpredictable changes in the economy, globalization, the technical revolution, competition intensification, the reviving of the service industry required rethinking the concept of corporate competitiveness. An important determinant of corporate successfulness consists in that knowledge and adequate information which positively contribute to the corporate value creation. Those intangible capital elements that play a crucial role in sustainable corporate value creation are intellectual capital. The knowledge, skills and competencies of managers and employees customer relations, the company's organizational structure are the main components of intellectual capital. Today, the software and the knowledge-based economies support the fact that the importance of intellectual capital has been growing in all sectors of the economy. The main aim of this study is to investigate the relationship between intellectual capital and corporate performance. To these, we carried out a comparative analysis of value added by intellectual capital for companies acting in different sectors from two neighbouring counties from Romania (Bihor) and Hungary (Hajdú-Bihar). The analysis is based on the financial statements for five years (2014-2018) of companies operating in agriculture, construction, manufacturing, wholesale trading, retail trade and transportation. We used the Value Added Intellectual Coefficient (VAIC) from Scorecard Methods as a measurement of intellectual capital. The investigation of the relationship between firms' performance and intellectual capital was performed using panel regression, where the established dependent variables were Operating Return on Assets (OROA), Operating Return on Sales (OROS) and the explanatory VAIC components: HCE, SCE, CCE. In the case of Romanian companies, a medium-strong correlation can be observed between OROA and VAIC components. In the case of Hungarian firms also a medium-strong correlation can be observed between OROS and VAIC components.*

Keywords: *intellectual capital, corporate value creation, human capital, customer capital, structural capital*

Jel Classification: *G3, G30, G32, O3, O30, O34*

1. Introduction

Today, the economies become software and service-based moreover. Therefore the competitiveness of the industrial era was replaced by information competitiveness. Rapid and unpredictable changes in the economic environment, globalization, and competition's intensification required rethinking and

reinterpretation of corporate competitiveness as a concept. Nowadays, the main determinants of corporate competitiveness are knowledge and adequate information. To become successful, companies should possess and adequately manage the knowledge by which the validation of core organizational competencies contributes to corporate value creation. The importance of these intangible capital elements has intensified in the recent year and becomes determinants of corporate competitive advantage strategically. The appropriate knowledge management, as a task, selects stores, packages, and communicates relevant information that influences corporate success to increase corporate performance and competitiveness (Bergeron, 2003). The sum of these intangible and non-financial capital elements possessed by a company and by which adequate management, company achieve sustainable competitive advantage is called intellectual capital. Among the elements of intellectual capital, we usually mention the totality of knowledge, skills and competencies possessed by employees and company managers. The customer capital and the efficient operational structures and information systems within the organization are also part of intellectual capital.

Besides gaining a competitive advantage, its long-term sustainability is also essential, so continuous monitoring of these intangible capital elements and examining their effects on corporate value creation becomes a vital function in the various life cycles of a company. An important task in knowledge management consists of quantifying and effectively managing the value added by intellectual capital. The definition and contents of intellectual capital and its proper measurement differ from author to author, therefore it is relatively difficult for an analyst to select the most appropriate method for research purposes (Chang and Hsieh, 2011). This study aims to carry out a comparative analysis of the value added of intellectual capital for companies operating in two different counties of Central and Eastern European countries (Romania and Hungary). The decomposing of intellectual capital into elements permits to compare the main factors that determine the value added of intellectual capital. It is also clear that the role of intellectual capital and the weight of its components may differ by sector in which the company is acting. Based on these, we also group the corporate's samples by different sectors to investigate the characteristics of the companies operating in each sector of economy in terms of intellectual capital. As we read in several articles dealing with intellectual capital, the relationship between intellectual capital and corporate performance and sustainable competitiveness is indisputable (Clarke et al., 2011; Chen et al., 2005, Chan, 2009, Bayraktaroglu et al., 2019). The main aim of this article is to investigate the relationship between intellectual capital and corporate performance.

2. Review of literature

In recent decades, increasingly significant differences between the book value and the market value of companies justify changes in the distribution of factors determining corporate value. A short time ago, the corporate value determinants were tangible elements, which can be shown in firms' balance sheet (machine, equipment, buildings), nowadays this is no longer typical. While the average book value of S&P 500 companies averaged 95% of the market value in 1978, today, this ratio barely reaches 20% (Juhász, 2004, p. 5). According to Baruch Lev (2004)

a skilled and experienced workforce, know-how, software, customer relationships, brand, unique organizational processes, models means more than half of the market capitalization of companies operating in the US. This lag can be explained by the increasing proportion and role of these intangible capital elements, which are not included in the firms' financial statement. Their role in knowledge-based economies has become increasingly important. Intellectual capital, as a concept, can be linked to Leif Edvinsson, who used it firstly in 1993 instead of the terminology of intangible assets.

However, these resources, which do not take material-physical or monetary form, extremely valuable to the company in term of corporates' value creation are called intellectual capital (Kaufmann - Schneider, 2004). According to Gu and Lev (2001), the intangible resources themselves do not represent value for a firm only if they contribute to the active processes of corporate value creation. In their opinion, the R&D, marketing and advertising activities and the company's HR and IT practices are considered critical value-creating determinants (Harangozó, 2007). According to Edvinsson and Malone (1999), intellectual capital is "information and knowledge that serve to create value". Both Brennan and Connel (2000) and Edvinsson and Sullivan consider that intellectual capital is the totality of knowledge-based assets in a firm. However, according to Edvinsson and Sullivan, organizational knowledge can be considered intellectual capital, which can be converted into value (Pfeil, 2004). According to Hunter et al. (2005), knowledge-based assets not included in the financial statements that can be converted into profit can be considered intellectual capital.

The definition of intellectual capital, as an economic variable, is based on the difference between a corporate's book value and market value (Maditinos et al., 2011). By analyzing the definitions mentioned above, it can be stated that common features of intellectual capital include knowledge and the ability to create value (Vishnu and Gupta, 2014). In term of the main components of it, the intellectual capital varies from author to author. Black et al. (2001) argue that intellectual capital consists of the following components: innovation capital, structural capital, market capital, and goodwill. Kaplan and Norton (2005) consider human skills, talent, information systems, infrastructure and organizational capital elements as culture, leadership, teamwork as main components of intellectual capital. One of the best known and most widespread definitions of the elements of intellectual capital was developed by Edvinsson. In his view, intellectual capital consists of two main components: human capital and structural capital. It divides structural capital into two other parts, customer capital and organizational capital. Three components of intellectual capital are mentioned in the international literature: human capital, customer capital, and organizational capital (Sveiby, 2001; Wang et al., 2014; Nimtrakoon, 2015; Bontis et al., 2015). Human capital represents the skills, competencies, knowledge and experience of employees primarily. These human factors are those, which contribute to corporate's value creation. These capital elements can be linked to the individual and are closely related to the qualities, creativity, and problem-solving abilities of the employees. One consequence of inadequate knowledge management represents when employees leave the company and take with them the competencies and experience they have acquired. Besides the ability of value creation and its size, Boda (2008) consider it also important: the constituent elements of it and their ownership. In his view, the problem is that sometimes companies invest in these invisible equity elements

(knowledge, skills, competencies), which the company does not own. The higher the level of knowledge, the more it depends on the carrier of knowledge, and it is more difficult to separate from it (Boda, 2008). Others cannot own human resources and the knowledge they possess.
In contrast with this, others can own structural capital. An important feature of structural capital is that it is independent of employees and company managers. Depending on the corporate culture, the types of capital components may differ (Bergeron, 2003). According to Edvinsson's approach, structural capital includes customer capital and organizational capital. Customer capital includes the companies' customer relationships, customer satisfaction, loyalty, trademarks, market share, distribution channels, brand name. Organizational capital includes organizational processes, structures, financial relationships, IT systems, and corporate culture as intellectual assets. Organizational capital includes organizational processes, structures, financial relationships, IT systems, and corporate culture as intellectual assets.

3. Research methodology

Several articles deal with studying the positive impact of intellectual capital and its performance on firm performance (Clarke et al., 2010; Maditinos et al., 2011; Goebel, 2015). The results of studies dealing with the correlation between intellectual capital and corporate performance in companies operating in different sectors (banking and finance, IT, hi-tech, pharmaceuticals, services, manufacturing) are quite different. Kamukama et al. (2010) suggest that differences in certain components of intellectual capital and their relationship with corporate performance are sector- and country-specific. The author classifies the development of the given country, sector, cultural differences and geographical location as the determinants of these differences. One of the most suitable methods for comparative analysis of the relationship between the intellectual capital components of companies operating in each sector is the Value Added Intellectual Coefficient (VAIC) (Sardo and Serrasquueiro, 2017).
In order to measure and adequately manage intellectual capital, it is essential to measure it. There are several ways to measure intellectual capital. Regarding this, Sveiby's (2010) work is decisive. In one of his papers, he mentions 42 methods, which can be divided into four major groups by their specificity: Direct Intellectual Capital methods (DIC), Market Capitalization Methods (MCM), Return on Assets (ROA), and Scorecard Methods (SC). While the methods from the first two categories determine intellectual capital at the organizational level with aggregate inputs and components, the methods from the latter two groups allow a more refined assessment of intellectual capital divided into components (Vishnu and Gupta, 2014).
In the present study, we used the Value Added Intellectual Coefficient (VAIC) as a measurement of intellectual capital. The great advantage of VAIC is that it decomposes the intellectual capital into elements, permitting in this way the assessment of value added by each element. Intellectual capital components are Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE) and Structural Capital Employed (SCE). The comparative analysis of VAIC is based on the financial statements of enterprises settled in neighbouring counties (Bihor, Hajdú-Bihar) of two Central and Eastern European countries (Romania and Hungary).

The companies included in the study operate in different sectors of the economy. The enterprise data were collected for five years (2014-2018) from the official website of the EMIS database.
This study aims to perform comparative analysis of VAIC and its components using the countries mentioned above' enterprise data. We also try to investigate the effect of VAIC components on companies' performance. In the first part of the analysis, we calculate the VAIC for the examined period, and then we determine the main statistics of VAIC. Considering that the effect of VAIC could be industry- and country-specific, we consider it important to determine the VAIC average of firms acting in the below mentioned economic sector. In this study, we determine the values of VAIC for companies operating in the following economic sectors: agriculture, construction, manufacturing, wholesale trading, retail trade and transportation. In Hungary, we used a totally of 653 firms' from Hajdú-Bihar County. In Romania, 687 firms' financial statements from Bihor County form the enterprise dataset.
Then we carried out a panel regression analysis to investigate the relationship between the components of VAIC and the firm's performance described by two return ratios (Operating Return on Sales - OROS and Operating Return on Assets - OROA). We used the method of panel regression analysis. Panel data analysis can be viewed as multilevel hierarchical modelling, which allows us to examine different variables. The panel model combines the analysis of cross-sectional and time-series data. The analysis was carried out with R statistics software system. The great advantage of this consist in the fact that it is an open-source program and contains the modules necessary for this study. Other advantages of this software are that it could be linked to an Excel spreadsheet. In this study, we used 'plm' and 'fPotrfolio' packages.

4. Results of research

In the first step of our empirical analysis, we determine the Value Added Intellectual Coefficient (VAIC), the main statistical features of both Hungarian and Romanian enterprises for the investigated period, and then we compare the results. The evolution of VAIC averages is presented in Figure 1. for the examined period (2014 – 2018).
Figure 1. shows the yearly evolution of VAIC for both Romanian and Hungarian firms. By comparing the graphs, different trends of VAIC could be observed for the investigated period. In the first period, the VAIC average slightly increases in the case of Romanian companies. From 2015, the VAIC mean decrease continuously until the end of the investigated period. Different evolution could be seen in the case of Hungarian companies' VAIC average. From 2014 to 2016, the VAIC values decrease significantly. In the next part of the investigated period, the VAIC begins to grow, which means a favourable development of value added by intellectual capital.
The yearly VAIC shows higher values for Romanian companies in the examined period, so that value added by intellectual capital is higher in Romanian companies. The range and interquartile range are more significant in Romanian companies, which suggest greater variability in term of VAIC. The high variability also means greater heterogeneity in term of intellectual capital. Excepting one

year, the VAIC's coefficient of variance shows higher values in Romanian companies, which also indicates greater variability.

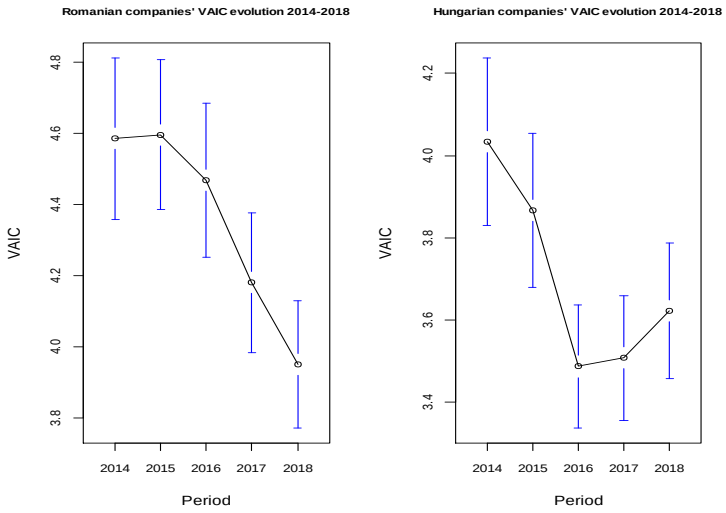

Figure 1: VAIC evolution for Hungarian and Romanian companies (2014 - 2018)
Source: own calculations using R statistical system

After these, we want to deepen the empirical analysis of VAIC, so we grouped the companies from both countries by sectors and decomposed the VAIC coefficient to its components for the last investigated year (2018). Then, we determine the mean and coefficient of variance for VAIC's components: Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE) for each group of companies' acting in the sectors mentioned above. The results are disposed in Table 1. and Table 2.

Table 1: The results of VAIC components for firms grouped by sector (2018)

		Agriculture		**Construction**		**Manufacturing**	
Indicator name	Statistical indicator	Romanian firms	Hungarian firms	Romanian firms	Hungarian firms	Romanian firms	Hungarian firms
Total firms		57	61	55	96	188	147
Human Capital Efficiency (HCE)	Mean	3.61	2.92	2.05	3.62	1.86	1.93
	Coefficient of variance	71.97%	58.24%	50.52%	86.98%	58.77%	48.48%
Structural Capital Efficiency (SCE)	Mean	0.57	0.53	0.53	0.54	0.39	0.38
	Coefficient of variance	45.12%	41.82%	138.69%	69.76%	245.96%	63.51%
Capital Employed Efficiency (CEE)	Mean	0.62	0.30	0.80	0.61	1.07	0.79
	Coefficient of variance	58.22%	27.95%	69.62%	45.94%	143.75%	91.20%

Source: Own calculation

The firms' acting in agriculture represents 8,30% from all investigated Romanian companies and 9,34% from the Hungarian corporate sample. As we can see from

Table 1., in both case, the greatest part of VAIC is represented by HCE, followed by SCE and CCE. This means that human resources, the employees' knowledge, and skills contribute significantly to increasing agricultural firms' value. Compared with all sectors' VAIC average (Romanian firms 3.95, Hungarian firms 3.62) the firms acting in agriculture takes higher VAIC values for both countries companies, which confirms the essential role of intellectual capital in this sector. The coefficient of variance values shows greater values at Romanian agricultural companies, which also indicates greater variability.
Construction companies represent 8.01% of the total Romanian sample and 14.70% of investigated Hungarian enterprises. The Hungarian construction companies' VAIC (4.77) exceeds both Hungarian total sample VAIC results (3.62) and Romanian construction firms' VAIC (3.37). Both countries companies' HCE represents a significant part of VAIC. The higher SCE's coefficient of variance for Romanian companies could be interpreted as a sign of great variability in term of value added by structural capital.
The manufacturing companies represents the second great part of investigated companies sample (Romanian firms 27.37%, Hungarian firms 22.51%). The VAIC values of Romanian and Hungarian manufacturing companies are very close to each other. This indicates the same role of intellectual capital for manufacturing firms in both countries. The great part of VAIC is represented by HCE in both countries, followed by CCE. High values of coefficient of variance indicate great heterogeneity and spatial variability in term of SCE and CEE of Romanian manufacturing companies. Large CCE's values mean that compared to other components of VAIC, the value added by the corporate property, the efficiency of assets is relatively high at manufacturing companies. This underlines the key role of physical assets as machines and equipment used in the firm's value creation process.

Table 2: The results of VAIC components for firms grouped by sector (2018)

		Wholesale trade		Retail trade		Transportation	
Indicator name	Statistical indicator	Romanian firms	Hungarian firms	Romanian firms	Hungarian firms	Romanian firms	Hungarian firms
Total firms		174	165	91	140	122	44
Human Capital Efficiency (HCE)	Mean	3.29	2.86	2.05	2.01	2.74	2.16
	Coefficient of variance	79.33%	75.39%	51.39%	49.67%	50.93%	51.66%
Structural Capital Efficiency (SCE)	Mean	0.55	0.52	0.42	0.42	0.54	0.46
	Coefficient of variance	44.15%	70.81%	52.82%	48.72%	132.47%	40.50%
Capital Employed Efficiency (CEE)	Mean	0.78	0.49	0.92	0.73	0.97	0.60
	Coefficient of variance	112.57%	80.13%	88.06%	100.89%	181.72%	57.17%

Source: Own calculation

The trading companies represent the greatest part of whole samples in both countries (Romanian firms 38.57%, Hungarian firms 46.71%). Greater VAIC values can be seen in the case of Romanian trading companies (Wholesale trade 4.63, Retail trade 3.39). Compared with the full sample average, the higher VAIC for wholesale trade companies highlights the great contribution of intellectual capital to

firms' performance. The major part of trading companies VAIC is HCE, in both countries. These indicate that employees' knowledge, skills represents the highest contribution to the company's value creation. The greater coefficient of variance of HCE in both countries shows greater spatial heterogeneity of investigated wholesale trading companies. The Romanian wholesale trading companies' and Hungarian retail trading companies' CCE variability is relatively high compared with other sectors' results, which means that trading companies vary a lot in term of CCE.

The Romanian transportation companies represent 17.76% of the whole firms' sample. The Hungarian firms acting in transportation means 6.74% of the examined companies. The VAIC of Romanian transportation firms (4.25) is higher than the Hungarian firms' VAIC mean. The VAIC level also exceeds the average of Romanian companies' VAIC (3.95). The HCE forms the greatest part of VAIC, so this has a great contribution to firms' value creation, followed by CCE. The lower values of SCE means that corporate structures and information systems have small contributions to enterprise value enrichment. The variability within the group is very high, which is equal to relatively high variability.

Comparing the result of VAIC, we can summarize that in Romanian companies, the sectors where the contribution of intellectual capital is dominant mainly in firms' value creation are the following: agriculture, wholesale trade and transportation. In Hungary, the sectors where intellectual capital has key role in corporate value creation are construction and wholesale trade. The higher average VAIC in the case of investigated Romanian companies confirms the indispensable role of intellectual capital on the aspect of corporate value creation.

In the last part of the analysis, we investigate the relationship between firms' performance and value added by intellectual capital. For this, we performed the panel regression analysis. As a measurement of corporate performance, we used two profitability indicators: the Operating Return on Sales (OROS) and Operating Return on Assets (OROA). The difference between Operating Return on Sales (OROS), Operating Return on Assets (OROA) and the regular Return on Sales (ROS), Return on Assets (ROA), consist in the numerators of their formulas. While the first two ratios use the Earnings before interest and taxes or operating income at the numerator of the equation, the second two uses the net income. So, the OROA and OROS do not consider the financial expenses as interests and taxes. These profitability ratios could be used with success in comparative analysis of firms' performance acting in different economic sectors. Corporate performance expressed like these provides a more accurate analysis of performance. Also, by using these profitability ratios, we can eliminate the effects of taxes, which is kindly different for Romanian and Hungarian companies. So, OROA and OROS are much more suitable in our comparative analysis for the reasons mentioned above. We used as explanatory variables the VAIC components: HCE, SCE, CCE. We also run the fixed and random (one-, two-ways panel, and Swamy-Arora-Amemiya's transformation) effect panel regression. Then, we compare the results by using Hausman-Test. We used the coefficient of determination (R^2) to test the goodness of fit of the panel models. In order to avoid multicollinearity, we also calculate the variance inflation factor (VIF). The variance inflation takes values less than 5 for each independent variables, so there is no danger of multicollinearity. Based on Hausman-Test, the two ways fixed effect panel regression model shows better results in Romanian firms.

The results of panel regression for Romanian companies are disclosed in Table 3. As we can see from the table, all of the coefficients are significant at least 5% of the significance level, so the VAIC' components could be used with success as independent variables to explain the OROA variable. This is also suggested by' ***' signs, which means the significance level is very close to 0. The results show that each VAIC components (HCE, SCE and CCE) are positively correlated with OROA.

By analyzing the coefficients of determination (R^2), we can conclude that in Romania companies (0,2974), the dependent variable variance can be explained by the independent variable in a proportion of 29.74%. Based on these, a medium-strong correlation between OROA and VAIC components is specific for investigated companies. The values of the coefficient of correlation also confirm these.

Table 3. Panel regression for Romanian companies (dependent variable: OROA)

Independent variables	Estimation	Std. Error	T- value	Pr(>|t|)
Human Capital Efficiency (HCE)	0.0444	0.0014	32.4909	< 2.2e-16 ***
Structural Capital Efficiency (SCE)	0.0164	0.0036	4.6208	3.999e-06 ***
Capital Employed Efficiency (CEE)	0.0068	0.0017	4.1241	3.833e-05 ***
R - squared (R2)	0.2974			
Coefficient of correlation (R)	0.5453			

Source: Own calculation

Using the same independent (HCE, SCE, CEE) and dependent (OROS, OROA) variables, we also performed the panel data regression for Hungarian companies. The results of two ways fixed effect panel regression model are presented in Table 4.

In the case of Hungarian firms, a stronger correlation can find out between OROS and VAIC components. In the case of OROS, the coefficients are significant at least 5% of the significance level. According to this, the VAIC' components could be used with success as independent variables to explain the OROS variable. This is also suggested by' ***' signs from Table 4. Compared with panel regression results for Romanian companies, the coefficients of determination (R^2) show a higher value (0.4088) in Hungarian companies. This means that the independent variable can explain the dependent variable variance in a proportion of 40.88%. The coefficients of determination (R^2) and coefficient of correlation suggest a medium-strong relationship between investigated firms' intellectual value components and corporate performance.

Table 4. Panel regression for Hungarian companies (dependent variable: OROS)

Independent variables	Estimation	Std. Error	T- value	Pr(>|t|)
Human Capital Efficiency (HCE)	0.0239	0.0008	31.4051	< 2.2e-16 ***
Structural Capital Efficiency (SCE)	0.0699	0.0045	15.4122	< 2.2e-16 ***
Capital Employed Efficiency (CEE)	0.0039	0.0013	3.1185	0.001838 **
R - squared (R^2)	0.4088			
Coefficient of correlation (R)	0.6393			

Source: Own calculation

In most of the studied scientific papers dealing with intellectual capital and its positive contribution to corporate value creation, we can read about the relationship between specific profitability ratios (ROA, ROS, ROE) and VAIC components. The results of panel regression analysis also confirmed these for the investigated firms from Romania and Hungary. Based on these, the present empirical analysis supports the fact that intellectual capital is the main determinants of corporate performance.

5. Conclusion

With the transition to modern, knowledge-based economies, the constituent elements of intellectual capital, such as knowledge, skills, corporate cultures, methods, are playing an increasingly important role in the process of corporate value creation over physical assets. This study aims to perform a comparative analysis of VAIC and its components for companies acting in different sectors and investigate the relationship between intellectual capital and corporate performance. Based on the higher VAIC average of investigated Romanian companies, we can conclude that the intellectual capital's contribution to corporate value creation is more significant than Hungarian companies' case. The reason for this is that Romania is a developing country, where the role of intellectual capital is much more pronounced. Also, cultural differences and geographical location, organizational features may be other determinants of these differences. For Bihor County, the results show that the contribution of intellectual capital to firms' performance is significant in companies acting in agriculture, wholesale trade, and transportation. In Hungary, intellectual capital plays a crucial role in corporate value creation at construction and wholesale trade companies. A medium-strong correlation can be seen between OROA and VAIC components in the case of investigated Romanian firms. For Hungarian companies, we find out that OROS is medium-strong correlated to VAIC each component. The results of panel data analysis support the finding that there is a direct relationship between value added by intellectual capital and firms' performance.

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