THE IMPACT OF INTELLECTUAL CAPITAL ON AUTOMOTIVE FIRM'S PERFORMANCE – CASE STUDY

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ABSTRACT
In the knowledge economy, company's activities are more based on intellectual capital than on financial capital. Therefore, well understanding and quantifying the impact of intellectual capital represents a prior necessity of firms' policy formulation. This paper presents the first results of a more developed empirical study, which has the purpose to determine the impact of intellectual capital on automotive industry's performance. The research is based on an adapted form of value added intellectual coefficient (VAIC) and is using data collected from the annual reports of the main competitor on the Romanian automotive marketplace. The findings highlight the influence of IC on four performance indicators and the results from the paper could help the company to develop strategies in order to obtain long-term competitiveness advantage.

KEYWORDS: *Automotive Industry, Intellectual capital, Performance indicators, Value Added Intellectual Coefficient.*

JEL CLASSIFICATION: *O34, L25, L62*

1. INTRODUCTION

In the knowledge based economy of today, an important topic of dialogue is the importance of intellectual capital. Instead of ongoing sterile conversation on the already not very clear topic, it is preferred concentrating all efforts in discovering the proper concept evaluation and its dimension.

In Europe, especially in the Nordic countries, the governments have taken actions to pass laws in order to force the private organizations to publicly disclose some documents of intellectual capital. The European Commission is investing massively in the research and promotion of intellectual capital, investments which will very soon lead to the establishment of rules and general instructions for the economic community, so as to permit the reporting of intellectual assets to the same extent as the traditional financial values.

In investment management, the decision to invest is presented as being the result of an evaluation of the investment project. The latter includes the determination of the economic efficiency of the project through different methods of evaluation. The economic efficiency indicates, to the fullest extent possible, the results obtained in an economic activity, evaluated in the light of the resources consumed for carrying out that activity. Its evaluation can be carried out by using different key indicators, such as: specific investment, the recovery period of investment, the economic efficiency coefficient, the investment return and others. Depending on the specificity of the industry branch and the activity carried out by the economic agent, the indicators specific to the economic activity are used for the evaluation thereof.

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uThe absence of the means of determining the intellectual capital values relevant to an investment opportunity transforms the decision to invest in a risky decision. A company with a significant proportion of intellectual capital which is not presented according to the traditional principles of accountancy and which shows growth potential in the future can easily be evaluated wrongly. The consequences can be small capitalization and reduced ability of the company to function at optimum level. Thus, new studies are necessary in order to solve the problems and develop a performance evaluation toolkit in respect to the intellectual capital and its use. This toolkit will be able to permit the improvement of the intellectual capital management process and the growth of the company's net value.

According to the study carried out by the National Institute of Statistics (INS) regarding INNOVATION IN ENTERPRISES IN THE BUSINESS ENVIRONMENT, during 2010-2012:

- one of five enterprises introduced or implemented a product, a process, a method of organization or of marketing, new or significantly improved;
- over half of products innovative enterprises developed their innovations within their own enterprise;
- 7.4% of the innovative enterprises had cooperation agreements for achieving the innovative activities;
- the advantages of the time advance has been the main method for maintaining or increasing competitiveness in the innovative enterprises;
- Most innovative SMEs registered in the South-East Region (36.1%) and the North-East Region (31.7%);

In 2012, the ratio of expenses for the internal research and development activities has almost doubled.

In Romania, the companies involved in research and development, or companies which hold intellectual property over some assets can benefit from two tax reliefs:

1. Accelerated assets depreciation (maximum 50% of the asset's tax value can be depreciated in the first year of use).
2. Additional deduction for eligible expenses relating to the activities of research and development, increased since February 2013, from 20% to 50%.

With a 0,5% percentage of GDP allocated to R&D and a developing relief scheme, Romania ranks 48 among the most innovative countries worldwide. ((Enache, 2014).

In *World Competitiveness Yearbook*, a study published by International Institute of Management Development, Romania climbed 8 places in 2014, when compared with the year 2013, ranking 47th place out of the 60 analyzed countries on how well countries manage their economic and human resources to increase their prosperity.

The progress is therefore visible, which is why the efforts to promote the importance of research and development and of matters relating to it, such as IC, as factors which produce a higher level of productivity and profitability, need to be strengthened.

In the Regional Automotive & Aerospace Workshop hosted by the British Embassy in Budapest, in july 2014, was presented the following facts:

The Automotive industry in the CEE region:

- Has a turnover of approx. £118bn, almost the double of UK's £60bn
- Has increased its output by 170% between 2009-2014"
- Has produced approx. 3.5 million vehicles in its 44 OEMs
- Contributes an average of 10% to the CEE countries GDP

In respect to the vehicle production per capita, the highest level worldwide was recorded in Slovakia with 167 cars manufactured in 2013, followed by the Czech Republic (112 cars), Slovenia (64 cars), Hungary (22 cars), Poland and Austria (each with 17 cars) and Romania (with 16 cars).

Regarding the number of employees in the automotive industry, Slovenia leads with 149,000, followed by the Czech Republic with 140,000 employees, Romania with 117,000 employees, Hungary with 65,000 employees, Slovakia with 51,000 employees, Austria with 29,000 employees, Slovenia with 13,000 employees, Bulgaria with 10,000 employees.

Also, regarding the evolution of car production within the last 13 years, the best situated is the Czech Republic with 1,132,931 units in 2013, compared to 455,492 in 2000, followed by Slovakia with 975,000 units in 2013, compared to 181,783 in 2000, and Poland with 583,258 units in 2013, compared to 504,972 in 2000.

In respect to assembly and engine production plants, the best situated are the Czech Republic and Poland, with 14, respectively 11 plants, followed by Austria with 6 plants, Hungary with 5 assembly and engine production plants, Slovakia and Romania, each with 3 plants, Croatia with 2 such plants and Bulgaria and Slovenia, countries which have only one car assembly and engine production plant. (http://www.business24.ro/auto/piata-auto/industria-auto-motorul-cresterii-economice-in-europa-centrala-si-de-est-1548295)

The innovation-driven status indicates that the economic development and growth depends on new product and service developments, and intellectual property (e.g. trademarks and copyrights). To sustain the country's innovativeness, the effective use of IC to continuously improve work processes and products/services must be underlined. (Phusavat et all, 2011)

Apparently, the globalization of markets, short product life cycles, and fast-changing customer demand have driven manufacturing firms to focus more on knowledge and IC (Keller, 2008, as cited by Phusavat et all).

The facts presented before highlight the need to increase the IC awareness among the automotive industry. This paper presents a case study made on the most important player of the Romanian automotive market: Automobile DACIA. Our research aims to explore and examine the possible interrelationships between IC and performance. The objective is to determine whether IC has positively contributed to the performance level of the analyzed firm.

2. Intellectual Capital – Literature review

A vast volume of research has been developed and furthermore written on the intellectual capital issue within the last period of time. Existing literature as well as books and papers are trying to asses a definition of the new emerged term correlated with what actually it embraces: intangible assets, non-financial assets, information assets, knowledge capital, hidden value and human capital (Bontis, 2001).

Unfortunately a concrete definition of the term is not yet given by the peers, although there is growing amount of research in this field.

Edvinson and Malone (1997) defined IC as the knowledge that can be converted into value, while in the same vain, Sullivan (2000) defined it as knowledge that can be converted into profits. Thus it is generally accepted that intellectual capital represents a source of value for every company. However, this added company value is not reported on the company's balance sheet. Moreover, it is a hidden value and its exact worth is difficult to determine. According to Edvinson and Malone (1997) IC can be also defined as the gap between a firm's book and market value. Therefore, traditional balance sheets only reflect the pure fundamental and basic situation, while the financial world mostly uses expectations, future perspectives and a company's potential to determine the value of a company. (Nedelcu, 2012).

The definition that best suits the problem at hand is the definition developed in collaborative effort. According to Petrash (1996), Edvinsson, Onge, Sullivan, the Canadian Imperial Bank of Commerce (CIBC) and Petrash together created the following definition:

$$\text{Intellectual Capital} = \text{Human Capital} + \text{Organizational Capital} + \text{Customer Capital}$$

There is one simple truth that is more difficult to attach a monetary value to intellectual capital, because knowledge flows and intangible assets are in essence non-financial. Researchers showed some reasons in favor of attaching a monetary value to intellectual capital. One step forward is that managers and stakeholders are used to determine a company's performance from the financial numbers stated in the annual report. They are used to review a balance sheet and to use these numbers to assess the financial health of an organization. Investors evaluate options for investment based on the information provided in the annual reports.

In order to quantify IC there are various methods developed and tested among the last period, but none of them was generally accepted as the one that disclose the correct value of intellectual capital.

As a result of a higher IC recognition, researchers are also keen to assess its impact on the companies' business performance (Morariu, 2014).
In Table 1 is presented a selection made by authors, of the most popular measurement and valuation methods.

Table 1. IC Measurement and valuation methods

Method	Scope
Balance Scorecard	A company's performance is measured by indicators covering four major focus perspectives: (1) financial perspective; (2) customer perspective; (3) internal process perspective; and (4) learning perspective. The indicators are based on the strategic objectives of the firm.
Skandia Navigator	The value scheme developed by Skandia contains both financial elements and combined non-financial elements, with the purpose of highlighting the value of a company on the market. This model focused on developing taxonomy of measuring the intangible assets and encouraged the researchers in this field to look beyond the traditional financial factor when calculating the real value of a company. The Skandia model is impressive by acknowledging the role of the commercial capital in achieving the company's value. At the same time it offers a wide coverage of structural, organizational and procedural factors, fact not witnessed until that moment (Banacu, 2004). Intellectual capital is measured through the analysis of up to 164 metric measures (91 intellectually based and 73 traditional metrics) that cover five components: (1) financial; (2) customer; (3) process; (4) renewal and development; and (5) human.
IC Rating	An extension of the Skandia Navigator framework incorporating ideas from the Intangible Assets Monitor; rating efficiency, renewal and risk. Applied in consulting
VAIC^{TM}	An equation that measures how much and how efficiently intellectual capital and capital employed create value based on the relationship to three major components: (1) capital employed; (2) human capital; and (3) structural capital.
IC Index	Consolidates all individual indicators representing intellectual properties and components into a single index. Changes in the index are then related to changes in the firm's market valuation.

Source: adapted from Sveiby (2010)

The main characteristics of VAIC are simplicity, subjectivity, reliability and comparability. We can acknowledge that there are certain limitations that the method brings at the table but even so it makes it an ideal measure for the context of our study.
Pulic's (1997) method aims to provide information about the value creation efficiency of both tangible (capital employed) and intangible (human and structural capital) assets of an organization (as cited by Maditinos et al., 2011).
VAIC provides quantifiable, objective and quantitative measurements, and can be implemented without any additional requirement on using any subjective grading or scores, involving with judgment scales (Pushavat et al., 2011).
Based on the definition presented in Table 1, VAIC is calculated as:

$$VAIC = VACE + VAHC + SCVA \qquad (1)$$

Where:

- VACE represents capital employed efficiency:

$$VACE = VA/CE \qquad (2)$$

- VAHC represents human capital efficiency:

$$VAHC = VA/HC \qquad (3)$$

- SCVA represents structural capital efficiency:

$$SCVA = SC/VA \qquad (4)$$

In order to calculate the above variables, it is necessary to calculate value added. VA is seen as the sum of benefits obtained by all the stakeholders: net income, wages, interest, tax, dividends.
Then, capital employed (CE), human capital (HC) and structural capital (SC) are being calculated using the bellow formulas:

$$CE = \text{Total assets} - \text{intangible assets} \qquad (5)$$

$$HC = \text{Total investment on employees} \qquad (6)$$

$$SC = VA - HU \qquad (7)$$

3. RESEARCH METHODOLOGY

Aiming to determine the relationship between the IC and firm's performance, was used a multiple regression model based on VAIC as an independent variable and certain independent variables represented by performance indicators. The required data were collected from firm's annual reports, corresponding to 2000-2013 period.
The study focus on the following performance indicators:

Return on Assets (ROA) indicates company's profitability relative to its total assets. This indicator shows the management efficiency in using company's assets for generating earnings.

$$ROA = \text{Net Income} \div \text{Total Assets} \qquad (8)$$

Return on Capital Employed (ROCE) is a financial ratio that measures a company's profitability and the efficiency with which its capital is employed.

$$ROCE = \text{Earnings before Interest and Tax} \div \text{Capital Employed} \qquad (9)$$

Sales Growth Rate (SGR)

$$SGR = (\text{Current Year's sales} - \text{Last Year's sales}) \div \text{Last Year's sales} * 100 \qquad (10)$$

Workforce Productivity (WP)

$$WP = \text{Total Revenue} \div \text{Number of employees} \quad (11)$$

In Table 2 are calculated the analyzed firm's performance indicators:

Table 2. Performance indicators

Year	**ROA**	**ROCE**	**Sales growth rate**	**WP**
2000	-0.15708	-23.01%	47.92640262	50696.38
2001	-0.27324	-20.96%	15.08487974	64741.33
2002	-0.27014	-62.06%	22.09954896	81986.01
2003	-0.21315	-24.75%	54.98726161	105506.7
2004	-0.11736	-17.27%	64.11131081	303255.7
2005	0.107932	12.58%	81.82536305	378016.8
2006	0.103616	16.10%	27.0927949	473385.1
2007	0.096386	21.22%	24.89250767	502113
2008	0.052155	1.32%	10.09648395	575006.1
2009	0.058708	8.35%	17.97255105	709232
2010	0.054113	8.80%	26.64123949	824950.9
2011	0.045184	10.15%	15.56168785	965268.2
2012	0.0421	9.34%	-3.306279425	934174.9
2013	0.04634	10.77%	44.42228783	1314276

Source: Calculated from firm's Annual Reports

On the assumption that IC positively affects company's performance, we formulated the following research hypothesis:

H1. VAIC positively affects ROA
H2. VAIC positively affects ROCE
H3. VAIC positively affects SGR
H4. VAIC positively affects WP

Aiming to examine those hypotheses, we evaluated the following regression models:

$$H1: ROA = \beta_0 + \beta_1 VAIC + \varepsilon \quad (12a)$$

$$H2: ROCE = \beta_0 + \beta_1 VAIC + \varepsilon \quad (12b)$$

$$H3: SGR = \beta_0 + \beta_1 VAIC + \varepsilon \quad (12c)$$

$$H4: WP = \beta_0 + \beta_1 VAIC + \varepsilon \quad (12d)$$

$$H1a, H1b \text{ and } H1c: ROA = \beta_0 + \beta_1 VACE + \beta_2 VAHC + \beta_1 SCVA \quad (13a)$$

$$H2a, H2b \text{ and } H2c: ROCE = \beta_0 + \beta_1 VACE + \beta_2 VAHC + \beta_1 SCVA \quad (13b)$$

$$H3a, H3b \text{ and } H3c: SGR = \beta_0 + \beta_1 VACE + \beta_2 VAHC + \beta_1 SCVA \quad (13c)$$

$$H4a, H4b \text{ and } H4c: WP = \beta_0 + \beta_1 VACE + \beta_2 VAHC + \beta_1 SCVA \quad (13d)$$

Aiming to test the above hypotheses, VAIC and its components' values are presented below:

Table 3. IC Calculation

Year	VACE	VAHC	SCVA	VAIC
2000	0.015715874	0.1104449	-8.05429	-7.51646
2001	-0.10758601	-0.7589058	2.317687	1.415476
2002	-0.12962006	-1.0271935	1.973526	0.768469
2003	-0.10993832	-1.3326897	1.750362	0.153169
2004	-0.03177614	-0.4556514	3.19466	2.677543
2005	0.198384793	2.3795777	0.579757	3.1584
2006	0.200999243	2.35513618	0.575396	3.131532
2007	0.202865262	2.3985169	0.583076	3.184458
2008	0.173800465	1.50044161	0.33353	2.007772
2009	0.207209439	1.45318169	0.311855	1.972246
2010	0.159823578	1.62941747	0.386284	2.175525
2011	0.204056761	1.4498937	0.310294	1.964245
2012	0.19295608	1.40088822	0.286167	1.880011
2013	0.194988953	1.33069984	0.248516	1.774205

Source: Calculated using data from firm's annual reports

The simple multiple linear regression is realized with the help of EXCEL program and consists of the following stages:

1. Estimation of the model's parameters
2. The correlation between the variables
3. Testing of the model's parameters. The parameters previously estimated, β_0 and β_1, will be tested with the help of Statistical Hypothesis Testing. For this, we will formulate the Null Hypothesis and the Alternative Hypothesis.

i) Testing of parameters β_0 and β_1

The two statistical hypotheses are:

β_0 or $\beta_1 = 0$ (the parameter is statistically significant)

β_0 or $\beta_1 \neq 0$ (the parameter is not statistically significant)

In order to verify which of the two hypothesis is correct, at a generally accepted level of significance of 95% ($\alpha = 0.05$), we will have to compare α with the value p_value from the table of the annex corresponding to β_0 (intercept in the table).

ii) Validity of the model

As in the previous case, the validity of the model is tested with the help of the Statistical Hypothesis Testing: H_0 the model is not valid; H_1 the model is valid

In this case, it has to be compared the value p_value with the value of $\alpha = 0.05$. If p_value is higher than α then the model is not valid at a significance threshold of 5%, but is might be valid at another significance level.

4. The determination coefficient (R^2) shows the proportion in which the dependent variable's variation is explained by the independent variable.

4. RESULTS

The estimated values of the regression equation's coefficients are found in the table of the annex. Thus, the regression equation is:

$$H1: \text{ROA} = -0.064 + 0.025 * \text{VAIC} \qquad (12a)$$

Table 4. Results from linear regression model on ROA

Regression Statistics	
Multiple R	0.4735
R Square	0.2242
Adjusted R Square	0.1595
Standard Error	0.1310
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.059	0.059	3.467	0.087
Residual	12	0.206	0.017		
Total	13	0.265			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.064	0.039	-1.623	0.130	-0.150	0.022
VAIC	0.025	0.013	1.862	0.087	-0.004	0.055

The value R = .47 from Table 4 shows us that 47% of the dependent variable ROA is explained by the VAIC variable.
Since the value p_value = 0.087 is higher than α, the conclusion of this statistical test is: that, at a level of significance of 95%, parameter β_0 is not statistically significant.
For β_1 as well, the conclusion is that the Alternative Hypothesis is accepted, that is β_1 parameter is not statistically significant.
The determination coefficient of this model has the value R^2=0.2242 and shows us that 22.42% of the dependent variable's variation is explained by the independent variable. In other words, 22.42 % of ROA variation is explained by VAIC.
From the analysis of the previous linear regression model, the conclusion is that the presented regression model is a valid one at a significance threshold of 90%, but not at 95%.
The degree of correlation between the two variables is a medium one, and the parameters of the regression model are not significant (β0) and significant (β1).
In order to observe how the ROA variable is influenced by the VAIC components, it was used the multiple linear regression, realized with EXCEL. That led to the following regression equation:

H1a, H1b and H1c: ROA = - 0.1332 + 0.7143 VACE + 0.035 VAHC + 0.0054 SCVA (13a)

Table 5. Results from multiple regression model on ROA

Regression Statistics	
Multiple R	0.9874
R Square	0.9750
Adjusted R Square	0.9675
Standard Error	0.0258
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.258739765	0.086246588	129.8788523	2.62779E-08
Residual	10	0.006640541	0.000664054		
Total	13	0.265380307			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.1332	0.0088	-15.2135	0.0000	-0.1527	-0.1137
VACE	0.7143	0.1831	3.9007	0.0030	0.3063	1.1223
VAHC	0.0350	0.0191	1.8370	0.0961	-0.0075	0.0774
SCVA	0.0054	0.0028	1.9247	0.0832	-0.0008	0.0116

According to the values obtained from Table 5, the following conclusions can be drawn:

i. The value of R square = 0.975 shows us that 97.5% of the dependent variable ROA is explained by the three independent variables.
ii. The values p_value from the last table of the annex corresponding to the parameters of the model, respectively $\beta_0, \beta_1, \beta_2, \beta_3$ are 0. 000; 0.003; 0.0961 and 0.0832. These are compared to the value α = 0.05 corresponding to the level of significance of 95%.
Following these comparisons, we conclude that β_0, β_1 are statistically significant, while β_2, β_3 are not.
iii. The value p_value=$2.68 \cdot 10^{-8}$ from the table2 of the annex (Significance F) is much lower than α = 0.05, which means that the regression model is a valid one.
iv. From the analysis of the multiple linear regression model's coefficients, we notice that the highest impact in ROA' formation is given by VACE. More specifically, when VACE increases by a unit, ROA increases by 0.7143 units.

The same procedure was used for testing the rest of the hypotheses and those are the results:

$$H2\text{: ROCE} = -\ 0.09 + 0.04 \times \text{VAIC} \qquad (12b)$$

Table 6. Results from linear regression model on ROCE

Regression Statistics	
Multiple R	0.4524
R Square	0.2047
Adjusted R Square	0.1384
Standard Error	0.2135
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.1408	0.1408	3.0878	0.1043
Residual	12	0.5471	0.0456		
Total	13	0.6879			

	Coefficients	*Standard*	*t Stat*	*P-value*	*Lower 95%*	*Upper*

		Error				*95%*
Intercept	-0.0871	0.0642	-1.3556	0.2002	-0.2270	0.0529
VAIC	0.0386	0.0220	1.7572	0.1043	-0.0093	0.0865

According to the values obtained from Table 6, the following conclusions can be drawn:

- 45.24% of the dependent variable ROCE is explained by the VAIC variable;
- the presented regression model is not valid neither at a significance threshold of 90%, or at 95%;
- 22.47 % of ROCE variation is explained by VAIC;
- the correlation degree between the two variables is a medium one, and the parameters of the regression model are not significant.

H2a, H2b and H2c: ROCE = -0.191 + 1.217×VACE + 0.038×VAHC + 0.010×SCVA (13b)

Table 7. Results from multiple regression model on ROCE

Regression Statistics	
Multiple R	0.9224
R Square	0.85082
Adjusted R Square	0.80606
Standard Error	0.1013
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.585293	0.195098	19.01045	0.000187174
Residual	10	0.102626	0.010263		
Total	13	0.687919			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.191	0.034	-5.554	0.000	-0.268	-0.115
VACE	1.217	0.720	1.691	0.122	-0.387	2.821
VAHC	0.038	0.075	0.502	0.627	-0.129	0.204
SCVA	0.010	0.011	0.868	0.406	-0.015	0.034

According to the values obtained from Table 7, the following conclusions can be drawn:

- 92.24% of the dependent variable ROCE is explained by the three independent variables.
- β_0 is statistically significant, while $\beta_1, \beta_2, \beta_3$ are not.
- p_value=0.00018 is much lower than $\alpha = 0.05$, which means that the regression model is a valid one.
- the highest impact in ROCE's formation is given by VACE. More specifically, when VACE increases by a unit, ROCE increases by 1.217 units.

H3: SGR = 33.58 – 1.11×VAIC (12c)

Table 8. Results from linear regression model on SGR

Regression Statistics	
Multiple R	0.1271
R Square	0.0161
Adjusted R Square	-0.0658
Standard Error	24.1791
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	115.1518	115.1518	0.1970	0.6651
Residual	12	7015.5258	584.6272		
Total	13	7130.6777			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	33.5803	7.2716	4.6180	0.0006	17.7369	49.4236
VAIC	-1.1051	2.4899	-0.4438	0.6651	-6.5301	4.3200

According to the values obtained from Table 8, the following conclusions can be drawn:

- 12.71% of the dependent variable SGR is explained by the VAIC variable;
- the presented regression model is not valid neither at a significance threshold of 90%, or at 95%;
- 1.61 % of SGR variation is explained by VAIC;
- the correlation degree between the two variables is very low, and the parameters of the regression model are not significant (β_1) and significant (β_0).

H3a, H3b and H3c: SGR = 36.14 – 162.59×VACE + 13.75×VAHC – 0.93×SCVA (13c)

Table 9. Results from multiple regression model on SGR

Regression Statistics	
Multiple R	0.3093
R Square	0.0956
Adjusted R Square	-0.1757
Standard Error	25.39426323
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	681.9916	227.3305	0.352522	0.788393706
Residual	10	6448.686	644.8686		
Total	13	7130.678			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	36.14	8.63	4.19	0.002	16.91	55.37
VACE	-162.59	180.45	-0.90	0.389	-564.66	239.48
VAHC	13.75	18.77	0.73	0.481	-28.08	55.58
SCVA	-0.93	2.75	-0.34	0.741	-7.06	5.20

According to the values obtained from Table 9, the following conclusions can be drawn:

- 9.56% of the dependent variable SGR is explained by the three independent variables.
- β_0 is statistically significant, while β_1, β_2, β_3 are not.
- p_value=0.788 is much bigger than $\alpha = 0.05$, which means that the regression model is not a valid one.

$$H4\text{: } WP = 442691.8 + 57873.1 \times VAIC \qquad (12d)$$

Table 10. Results from linear regression model on WP

Regression Statistics	
Multiple R	0.3981
R Square	0.1584
Adjusted R Square	0.0883
Standard Error	373884.1237
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.15834E+11	3.15834E+11	2.259356567	0.1587
Residual	12	1.67747E+12	1.39789E+11		
Total	13	1.99331E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	442691.8	112440.9578	3.937104905	0.002	197704.0451	687679.6481
VAIC	57873.1	38502.11095	1.50311562	0.159	-26015.76893	141762.0177

According to the values obtained from Table 10, the following conclusions can be drawn:

- 39.81% of the dependent variable WP is explained by the VAIC variable;
- the presented regression model is not valid neither at a significance threshold of 90%, or at 95%;
- 15.84 % of WP variation is explained by VAIC;
- the correlation degree between the two variables is low, and the parameters of the regression model are not significant (β_1) and significant (β_0).

H4a, H4b and H4c:

$$WP = 280346.5 + 6639614 \times VACE - 474988 \times VAHC + 32291.43 \times SCVA \qquad (13d)$$

Table 11. Results from multiple regression model on WP

Regression Statistics	
Multiple R	0.9095
R Square	0.8272
Adjusted R Square	0.7754
Standard Error	185565.3
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	1.64896E+12	5.5E+11	15.96231	0.000385296
Residual	10	3.44345E+11	3.44E+10		
Total	13	1.99331E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	280346.5	63062.865	4.446	0.001	139833.675	420859.313
VACE	6639614	1318626.342	5.035	0.001	3701530.996	9577696.140
VAHC	-474988	137185.578	-3.462	0.006	-780656.863	-169319.832
SCVA	32291.43	20102.210	1.606	0.139	-12499.087	77081.945

According to the values obtained from Table 11, the following conclusions can be drawn:

- 90.95% of the dependent variable WP is explained by the three independent variables.
- $\beta_0, \beta_1, \beta_2,$ are statistically significant, while β_3 is not.
- p_value=0.00038 is much lower than $\alpha = 0.05$, which means that the regression model is a valid one.
- the highest impact in WP's formation is given by VACE. More specifically, when VACE increases by a unit, WP increases by 6639614 units.

5. CONCLUSIONS

As Chen et al (2005) concluded, IC is indeed a significant strategic asset, since it is positively related to firm's financial performance.
The VAIC approach has been moreover adopted in various other studies, mostly in those conducted in emerging and developing countries.
The presented study case it has proved to be another attempt to underline the importance and the efficiency of IC (measured using the VAIC method). Excepting the sales growth rate model, all the regression models are valid, which means that IC has impact over the firm's performance indicators. The results reflected that CE positively impacts the company's performance indicators. As the value of VACE increases, so is the value of ROA, ROCE, SGR or WP. In addition, the firm should strengthen its intangible assets as an alternative to increase the VACE. VACE has the bigger influence on firm's performance, which allows as concluding that the company is placing greater faith and value in physical capital assets, than in others that are more related to IC. Based on the VAHC formula, the company should not drastically reduce the expenditures on employees as it could negatively impact the morale and motivation.

The company should understand that only by developing their intellectual assets will be able to gain a sustainable competitive advantage, to remain the leader on the Romanian market and to be a worthy competitor on the international marketplace.

The results of our study case underline the fact that IC is increasingly recognized as an important strategic asset for sustainable competitive advantage.

According to Stahle, Stahle and Aho (2011), VAIC method involves a yet unsettled conception of IC capitalization via its components of human and structural capital.

Nevertheless, VAIC as a method of measurement has lots of issues, as the most of the measurement tools do. In order to draw a more complete conclusion about its efficiency and, therefore, be able to fully support or criticize this method, further research is needed. The authors have in plan an industry analysis, using the methodology presented before, with needed adjustment.

Moreover, future research should focus on comparing VAIC method with other IC valuation methods and based on those conclusions, to develop and test an IC efficiency model.

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