INTELLECTUAL CAPITAL EFFICIENCY AND THE GROWTH RATE OF A COMPANY

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ABSTRACT

Intellectual capital (IC) has evolved and excelled as an academic discipline since the early 1990s, and has reached the fourth stage of research. Research was promoted by analysts in companies to understand the value creation process and identify resources required. Investment and spending on IC and value creation analysis have changed a firm's decisions and impact analysis.

Elaborating on the analysis of a company's statements, as audited and public data, a thorough analysis of companies' IC and its components has been undertaken, improving the methodology of the evaluation of the impact. This article contributes to the development of intellectual capital theory, value-based management theory, and resource-view theory.

In the paper, the author proves the hypothesis on the impact of intellectual components on the growth rate of Nasdaq Baltic issuers in the period 2012 to 2019, extending the composite model with intellectual capital variables identified in the research, by adding normalisation proxies, longitudinal analysis and a number of moderate and control variables. The author's proposed analysis also demonstrates the use of theoretical methods at the Baltic level, and new aspects and unique results at an international level. The study reveals a significant and positive relationship between intellectual capital efficiency, its components, and the growth rate of the companies, identifying dominating significant constituents of intellectual capital in Nasdaq Baltic companies

KEY WORDS: *intellectual capital, IC components, growth rate.*

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Introduction

Intellectual capital (IC) as a term appeared at the end of the 1990s, adding to the bulk terminology of terms such as 'intangible assets', 'trademark', 'good repute', and 'intellectual property'. The concept of 'intellectual capital' can be described by terms widely used in accounting. The reason the new terminology was invented was the growing role of IC as a management object, and this new approach created a need to describe the scale and scope of the new era and the concept of creating the value of a company by involving previously unused reserves, such as knowledge, relations with stakeholders, consumers and clients, competence, corporate structures, information technology, motivation systems, innovation processes, etc.

The strategic goals of companies are to survive, ensure growth, earn, create value, and develop. IC investment and spending are behind the success of most companies, and constitute a crucial part of more than 90% of the market capitalisation of the S&P500, for example. Nasdaq Baltic is one of the platforms for analysis, to test the impact analysis and growth rate of companies in Latvia, Lithuania and Estonia. The main aim of this article is to evaluate the impact of intellectual capital and its components on an enterprise's growth rate. The methods chosen are modified intellectual capital value added coefficient and the intellectual capital efficiency ratio. The research was based on a panel time-series sample of 92 companies and the seven-year observation of companies listed on the Baltic Stock Exchange between 2013 and 2019.

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Statement to be defended: intellectual capital has a positive significant impact on the sales growth rate with a time lag.

Research object: Nasdaq Baltic issuers.

Research subject: intellectual capital components' efficiency impact evaluation.

Research goal: to develop and approbate a systematic approach to assess the impact of intellectual capital and its components on the sales growth rate of companies in Latvia, Lithuania and Estonia.

The research task is to develop conclusions and proposals for evaluating, systematising and improving the management capability of an enterprise's impact on company performance indicators, as well as developing a management planning and control system evaluating intellectual capital impact.

The research is based on management theories, which include the analysis of the modern expansion of IC and the theory related to its evaluation, including the impact of IC on a company's performance indicators. The methods applied are comparative, quantitative and qualitative analysis, using indicators of descriptive statistical analysis, OLS multiple regressions, and longitudinal regressions. The method of scientific deduction was used to draw conclusions, to systematise and theoretically substantiate the personal research and experience of other authors.

The research looks at several research questions:

1. What are the intellectual capital efficiency measures to use?
2. How to evaluate the impact of the efficiency of IC on the performance of a company?
3. How long does it take to see the impact of intellectual capital (longitudinal analysis)?
4. How to choose between normalisation proxies for intellectual capital variables, i.e., choosing between adjustment for assets, value added or sales revenue?

1. The evolution of intellectual capital

IC theory has evolved from several theories that dominated in the 20th century in the strategic management field. The research by Lentjušenkova and Lapiņa (2016) identifies the resource-based view (RBV), the competence-based view, and the knowledge-based view. These theories have created the knowledge base for new theoretical planning, set-ups, methods and models to analyse IC and related issues, and to boost companies' performance and confidence to employ knowledge resources, as new wealth, in a more sophisticated and efficient way.

An analysis of research on IC and other related peer-reviewed articles proves that over recent years the composition and classification of IC has been getting more extensive and richer (Ferenhof, 2015). First, the only originally mentioned human capital and structural capital are accompanied by relational capital, and, in the light of the recent transfer to the fourth stage of the research, by social capital, and are still sometimes used as synonyms, but they are not. Second, each of the components has exploded into whole meta-system. Third, it is very often the case that the components interrelate and overlap, as sub-capitals are widely interpreted and not strictly affiliated to one or another capital group.

Discussing the measurement system, and even more the efficiency notion, and to add to the complexity evaluation on the impact on performance indicators, the literature base explodes in the research on methods and critics. The main contribution to the theory of resources has changed the perception of IC from a static to a dynamic view.

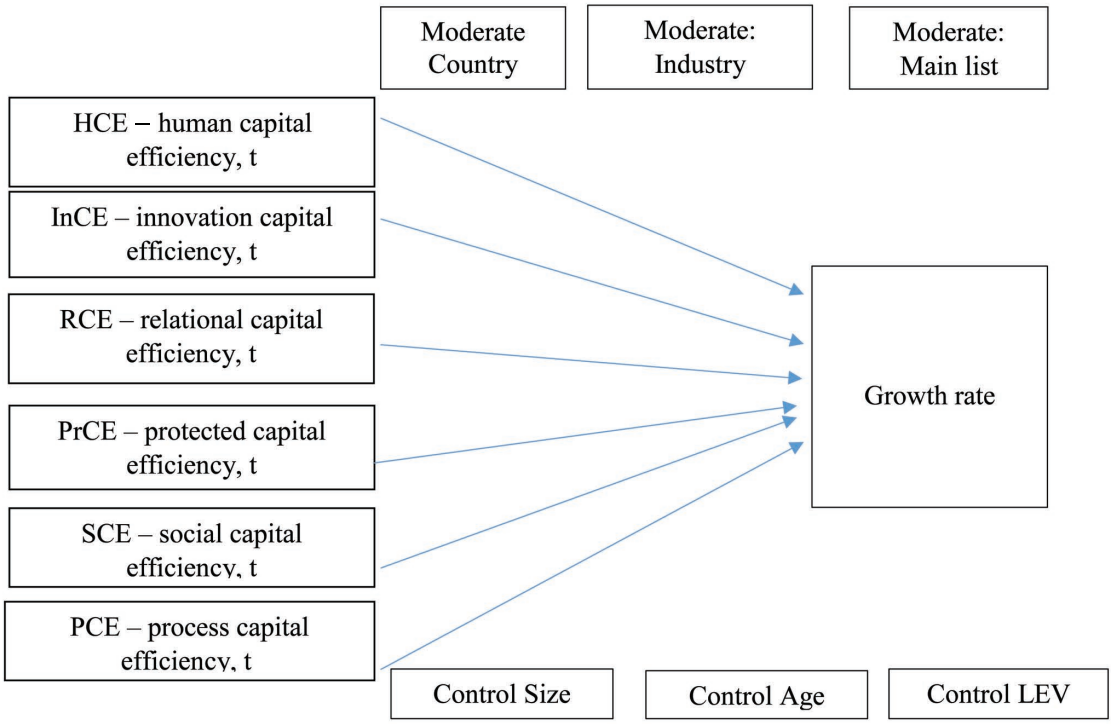
Similarly, the number of definitions and the expanding number of classifications, measurement models and target groups (Dumay, 2015) using IC measurement systems is growing. The initiative to elaborate on IC research was presented by enterprises and commercial entities. Later, models were also developed for non-profit organisations, educational institutions and government bodies.

Since the beginning of the third millennium, impact assessment, or the correlation between intellectual capital ratios and performance indicators, as well as forecasts, has been very much centered on the discussion of the research and practitioners. Intellectual capital impact assessment has been explored in a number of research papers (Javornik et al., 2012; Jordao et al., 2018; Lin, 2018; Nadeem et al., 2017; Pedro et al., 2018; Scafarto et al.,

2016; Sardo et al, 2017), showing gaps in the research and opportunities for research. Most of the research focuses on profitability ratios, adjusting for value added, and analysing the current period. Bibliographical analysis and research gaps indicate contradictory results for IC components and performance ratios, as well as a lack of results for new IC variables, such as innovation, social and relational capital, a lack of longitudinal analysis, and the need to improve methodology, for example, testing for adjustment proxies, control and moderate variables.

2. Growth rate model

The main objective of the current study is to analyse the influence of IC on a firm's growth rate, treating costs as investments (see graph 1, Growth Rate Model).



Graph 1. Growth Rate Model

Source: compiled by the author.

Alternatively:

$$GR_{ti} = \beta_0 + \beta_1 HCE_{ti} + \beta_2 RCE_{ti} + \beta_3 PrCE_{ti} + \beta_4 PCE_{ti} + \beta_5 SCE + \beta_6 InCE + \beta_7 lnAGE_{ti} + \\ + \beta_8 lnSIZE_{ti} + \beta_9 LEV_{ti} + \beta_{10} CEE_{ti} + Dummy\ main\ list + Dummy\ LV + Dummy\ EST + \\ + Dummy\ LT + DummyI1 \ldots n + e, \quad (2.1.)$$

where: *GR* – growth rate; *HCE* – human capital efficiency; *RCE* – relational capital efficiency; *PrCE* – protected capital efficiency; *PCE* – process capital efficiency; *SCE* – social capital efficiency; *InCE* – innovation capital efficiency; *AGE* – age control variable; *SIZE* – size control variable; *LEV* – leverage control variable; *CEE* – moderator fixed capital employed efficiency; *Dummy LV* – Nasdaq Riga; *Dummy LT* – Nasdaq Vilnius; *Dummy EST* – Nasdaq Tallinn; *Dummy main list* – Issues in Nasdaq main list; *Dummy industry 1…n* – Dummies for each NACE industry; *T* – current period; *I* – Nasdaq issue; *εi, t* is the error

The growth rate is important for investors and management to determine the future success of a business. A company's growth is measurable in several categories. These categories include revenue growth, profit growth, employee growth and asset growth, depending on what the management team decides to measure. In the current report, the author measures revenue growth.

Human capital efficiency was first discussed in articles by Ante Pulic in 2001, 2004 and 2008, and was recognised as one of the crucial elements of the analysis by numerous researchers (Dzenopoljac, 2016). The majority of authors have adjusted personnel costs to added value. In the current research, sales revenue is used as an adjustment, as it helps to avoid interpretation issues when the value added number is negative.

Human capital efficiency = personnel costs/sales revenue. (2.2.)

Marketing is concerned with the task of developing and managing customer relationships. In order to standardise the proxy for the measurement of relational capital:

RCE = RC/sales revenue = marketing costs/sales revenue. (2.3.)

Research and development (R&D) expenditure has been used extensively in the literature as a proxy for innovation capacity. The efficiency of innovation is calculated in the following way:

InCE = InC/sales revenue = R&D/sales revenue. (2.4.)

Intellectual property/intangible assets is defined in this study as protected capital, which is legally protected rights concerning the ownership of specific assets, such as trademark, patent, industrial design and copyright (Anifowose, 2018).

PrCE = PR/sales revenue = (trademark value+patent costs+copyright+
+ industrial design+intangible assets)/sales revenue. (2.5.)

Two measurement indicators for process capital can be used: investment in information technology and administrative expenses.

PCE (process capital) = PC/sales revenue = (IT + board salary)/sales revenue
(Scafarto, 2016). (2.6.)

Social capital can be measured in the IC ecosystem in the fourth stage of the research as support to society outside the company. The relations can be causal.

SCE = SC/sales revenue = donations and financial support/sales revenue. (2.7.)

The measurement of control variables chosen for the current research are:

1. Lev,t is the natural logarithm of the leverage of the current period, given by the ratio of the book value of total debt of the current period to total assets of the current period.
2. SIZEi,t is the size of the current period, given by the natural logarithm of total assets of the current period.
3. AGEi,t is the firm's age in the current period, given by the natural logarithm of the number of years of existence of the firm of the current period (Sardo, 2017).

Moderating variables in the current research are:

1. Nasdaq list – main or secondary.
2. Country – Latvia, Lithuania, Estonia.
3. NACE – 15 industries.

The data was collected primarily from the balance sheets, profit and loss statements, and notes where major cost positions where explained, of Nasdaq Baltic (Latvia, Lithuania and Estonia) stock issuers, 92 companies, for the period 2013 to 2019.

The whole sample was used, no sampling was attributed. The research was conducted based on a panel time-series sample of 92 companies, and the seven-year observation of companies listed on the Baltic Stock Exchange between 2013 and 2019.

Panel data, a combination of time series and cross section, is the structure of the research database. As companies do not report all data, and have presented notes to financial reports in different formats or scales of reporting, the data panel is unbalanced. The panel data analysis allows for identifying the same cross-sectional relationship at different points in time, and accounts for individual heterogeneity. In this case, the fixed-effect panel data model will be estimated, to treat the unobserved individual heterogeneity for each company to be correlated with the explanatory independent variables.

3. Results

Due to missing values and outliers, the data cleaning process demanded consideration, to avoid a significant effect on the final statistical results. Due to a lack of data on innovation capital efficiency and social capital efficiency, they are not used in the analysis. Due to the small number of companies represented in each industry at this stage, dummies for the industry are not used.

Consistency checks served to identify data which is out of range, logically inconsistent or has extreme values. The missing responses were treated carefully to minimise their adverse effects, by assigning a suitable value (neutral or imputed), or discarding them methodically (case-wise or pair-wise deletion). For each of the variables, first and second quartiles were calculated, obtaining in the quartile range the upper and lower limits, and outliers were identified. Outliers were further excluded from the analysis.

The efficiency ratios were adjusted for value added, assets and sales as proxies, and the value added proxy was chosen for analysis based on the precise and appropriate impact results, the significance of the variables, and lower confidence intervals. Summarising the IC impact model and adjusting IC variables by the value-added gives more colour to the analysis, extracting more variables on the IC side with an impact on the sales growth rate, and also enriching the control and list of moderate variables predicting future success.

Table 3.1. GR model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.	
1	,812[a]	,659	,633	64,750	24,937	,000[b]	

Source: compiled by the author.

The model proves to be significant ($F = 24.937$, $p = 0.000$) with a high explanatory power ($R = 0.812$, $R^2 = 0.659$) (see Table 3.1. GR model summary). The variables human capital efficiency (HCE), i.e., spending on employees, including salary, insurance and other personnel costs, and process capital efficiency (PCE), i.e., compensation for board members and costs of IT services, as well as the control variable age, i.e., the age of the company, prove to be significant variables in the model (see Table 3.2. GR model coefficients) if we analyse the significance of the selected variables, meaning that mature companies show better spending to sales growth outcome efficiency than younger ones, due to the experience and skills obtained.

Table 3.2. GR model coefficients

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	204,237	88,944		2,296	,023
DummyLT	16,188	13,875	,075	1,167	,245
DummyLV	-36,929	22,055	-,121	-1,674	,096
ControlvariableAge	-97,180	18,591	-,287	-5,227	,000
ControlSize	2,959	5,437	,033	,544	,587
ControlLEV	16,722	10,803	,086	1,548	,124
RCE	17,394	97,544	,011	,178	,859
HCE	327,047	60,340	,399	5,420	,000
PrCE	352,247	605,285	,035	,582	,562
CEE	29,006	21,751	,106	1,334	,185
PCE	966,160	211,570	,352	4,567	,000

Source: compiled by the author.

Table 3.3. IC impact on ln sales in period t-1, value added proxies, shortlisted, Baltic Nasdaq issuers, Latvia, Lithuania, Estonia, 2012–2019

Parameter	B	Std. Error	t	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	1.805	.573	3.151	.002	.049	3.151	.933
List	.443	.177	2.506	.013	.032	2.506	.803
Size_ln	.766	.051	15.076	.000	.543	15.076	1.000
Lev_ln	.087	.044	1.986	.049	.020	1.986	.631
RCE_CVA_1	.309	.117	2.643	.009	.035	2.643	.839
HCE_HCVA_1	-.028	.010	-2.761	.006	.038	2.761	.866
PCE_CVA_1	.385	.134	2.877	.004	.042	2.877	.889
[Country=1]	.644	.158	4.079	.000	.080	4.079	.992
[Country=3]	0[b]	.	.	.	.	.	.

Source: compiled by the author.

The analysis of the spending in period t-1 (see Table 3.3. IC impact on ln Sales in period t-1, value added proxies, shortlisted, Baltic Nasdaq Issuers, Latvia, Lithuania, Estonia, 2012–2019) proves the lag period effect, as the model indicates that spending on relational (marketing and sales), human (personnel costs) and processes (IT and board costs) have a positive and significant impact on the sales growth rate in period t.

Moderate and control variables also indicated the leverage of the company in the period t-1 as significant for the increase in sales revenue rate in the period t. This might be explained by the fact that the high leverage of the company allows for the extended spending and positive impact in the next period business ratios.

Conclusions

Since the beginning of the third millennium, impact assessment, or the correlation between the intellectual capital ratio and performance indicators, as well as forecasts, have been very much centered on discussion of the research and the practitioners. The research proves the growth rate is significantly influenced by

spending on employees, as salary, insurance and other personnel costs, as well as on compensation for board members and the costs of IT services, for companies registered in Estonia, Latvia and Estonia, issuers on the Nasdaq Baltic Stock Exchange. The control variable age has a significant impact on the company growth rate. Choosing between value added, assets and sales adjustment proxies for intellectual capital variables, the value added proxy was chosen for analysis based on the results of the model impact evaluation. IC components have a significant positive impact on sales growth, and with a time lag

Recommendations

1. Companies are required to publish their annual reports on the Nasdaq webpage. As companies use different individual approaches to notes to the financial statements in their reporting to Nasdaq Baltic, Nasdaq Baltic can define more clearly its requirements for the notes to the financial statements that companies submit, harmonise the structure of the descriptions, and specify the data required and the format.
2. Nasdaq Baltic and Nordic, in cooperation with Morningstar, a leading provider of independent investment research, have introduced a company fact sheet to increase investor awareness for publicly traded small and medium-size enterprises. The initiative could be extended, making this data available in Excel or any other workable format, and sector/country/industry level summaries or averages could be produced to allow for further comparative and impact analysis.
3. An elaborated approach to the systematisation of the impact of IC and its efficiency on the performance of a company can be used both in Latvia and in other countries in the world; it could be used to support and purposefully develop a policy for the effective use of the IC and other resources of a company, as well as the planning, investing, comparative analysis and decision-making process.

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INTELEKTINIO KAPITALO VEIKSMINGUMAS IR BENDROVĖS AUGIMAS

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Santrauka

Intelektinis kapitalas (IK), kaip akademinė disciplina, vystėsi nuo 10-ojo praeito amžiaus dešimtmečio pradžios ir jau pasiekė ketvirtą tyrimo etapą. Įmonių analitikai skatino tyrimus, siekdami suprasti vertės kūrimo procesą ir nustatyti būtinus išteklius. Investicijos ir išlaidos IK ir vertės kūrimo analizei pakeitė įmonės sprendimus ir poveikio analizę. Analizuojant bendrovės viešai skelbiamas ataskaitas ir kitus viešai prieinamus duomenis, atlikta išsami bendrovių integracijos bei jos sudedamųjų dalių analizė, tobulinant intelektinio kapitalo poveikio organizacijos efektyvumui vertinimo metodiką. Šis straipsnis prisideda prie intelektinio kapitalo, vertėmis pagrįsto valdymo ir išteklių požiūrio teorijų kūrimo.

Pagrindinis straipsnio tikslas – įvertinti intelektinio kapitalo ir jo komponentų įtaką įmonės augimo tempui. Pasirinkti metodai: teorinė analizė, sintezė, pagrįsta vertinimo metodika, kurioje išskirti modifikuoti intelektinio kapitalo pridėtinės vertės ir intelektinio kapitalo veiksmingumo koeficientai. Tyrimai atlikti, remiantis 92 įmonių grupių laiko eilučių imtimi ir septynerių metų trukmės į Baltijos vertybinių popierių biržos prekybos sąrašą įtrauktų įmonių stebėjimu 2013–2019 m. Šis straipsnis prisideda prie intelektinio kapitalo teorijos, verte pagrįsto valdymo ir išteklių valdymo teorijų plėtotės.

Straipsnyje pagrįsta hipotezė dėl intelektinių komponentų įtakos „Nasdaq Baltic" emitentų augimo tempui 2012–2019 m. Analizė atskleidžia, kaip teoriniai metodai, taikomi Baltijos jūros regiono šalyse, pagrindžia

naujus aspektus ir unikalius rezultatus tarptautiniu lygmeniu. Šis tyrimas atskleidžia reikšmingą teigiamą intelektinio kapitalo efektyvumo, jo sudedamųjų dalių ir įmonių augimo tempų tarpusavio ryšį, nustatant svarbias intelektinio kapitalo sudedamąsias dalis NASDAQ Baltijos bendrovėse.

PAGRINDINIAI ŽODŽIAI: *intelektinis kapitalas, IK komponentai, augimo tempas*.

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