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Impact of Marketing, Sales and Innovations on Business Performance Analysis in Intellectual Capital Research: Latvia, Estonia and Lithuania

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Abstract: Intellectual capital components' meta system has exploded in the past decade following the four decades of intellectual capital research evolution, followed by wide discussions on definitions, measurements, reporting, impact analysis, etc. The evolution of IC research has been divided into four stages, although the borders between them are fluid and the exchange of ideas has grown in all directions at tremendous speed since the end of the 1990s. The intellectual capital theory has evolved from the resource-based view, competence-based view, and knowledge-based view. Intellectual capital, a new term, appeared in the 1990s and, in essence, coincided with the concept of intangible assets. In particular, researchers agree that the terms "intangible assets", "trademark", "good repute", and "intellectual property" in accounting and valuation activities do not cover everything that should be included in the new concept. It is about using intangible assets as a management object to increase the value of the company by involving previously unused reserves such as knowledge, information technology, customer satisfaction, etc. There is no unified definition; therefore, there is flexibility in using the term. Owing to its significance in the new sustainable reality, intellectual capital has become crucial for growing economies and has been recognized as a fundamental discipline that is thoroughly supported by practitioners and government structures worldwide. On the basis of the analysis of intellectual capital research, research questions can be defined in the form of a block-chain of the research areas, including a) terminology and definition b) components and classification; c) measurement and evaluation systems; d) value creation and, more recently, distortions; e) efficiency and effectiveness; f) reporting and disclosure; g) impact assessment; h) decision-making; and i) indication of contradictions and gaps for further research. The study used a sample of Nasdaq Baltic Issuers in Latvia, Lithuania and Estonia for the prepandemic period of 2012--2019 and collected 84 data units from the annexes to yearly financial statements explaining the cash flow and profit and loss statements of each. As companies are publicly listed, the financial measurements on the performance side were provided by the Morning star reports. Longitudinal regression analysis was applied for the impact analysis. The findings confirm that relational capital, measured as marketing and sales components with proxies for assets, sales revenue and value added, is significant in the case of ROA, ROE, ROS and RBS, which have positive impacts and do not affect the price–earnings ratio of listed companies in Baltics. The exploratory longitudinal analysis confirms the data regarding the existence of a total of six factors in the pilot study that have an impact on the business performance indicators while showing different levels of significance, directions of impact and time scales, which highlights the unique findings of the current extended research on intellectual capital and is the first time that it has been applied in Baltic countries. Testing for the different proxies and moderate and control variables introduces new aspects to the analysis of the impact of resource deployment on business performance overall. Simultaneously, simplifying the model using composite aggregate ratios on both sides of the equation has created a precondition for optimizing impact models worldwide.

Keywords: Baltic countries; innovation capital; intellectual capital; longitudinal impact analysis; marketing; relational capital; sales.
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1. Introduction. The Unified Baltic Stock Exchange - NASDAQ OMX Baltic – was introduced on January 1, 2007. It was implemented to promote the integration of the Baltic securities market. The "Nasdaq Baltic market" represents a joint offering of Nasdaq's exchanges in Tallinn, Riga, and Vilnius as well as the Nasdaq CSD. The Nasdaq Baltic market includes a common Baltic equity market with harmonized trading rules and market practices, the same trading system, joint trading lists, harmonized indices, a single membership, trading, and settlement currency allowing investors easy access to all Baltic listed financial instruments through any of the pan-Baltic members". At present, joint-stock companies of NASDAQ OMX Baltic are divided into two lists: main (market capitalization min 4 mln and requirement for 25% share turnover) and secondary (medium-sized companies, no quantitative requirements for capitalization or the number of shares in free circulation for stock issuers). Overall turnover in three years – EUR 987 mln.

Companies have obligatory requirements to publish yearly reports on the Nasdaq webpage. In cooperation with Morningstar, Nasdaq Baltic and Nordic produced calculations for one hundred items to use for the research and analysis. The availability of the data allows us to contribute to intellectual capital research and impact analysis worldwide.

Intellectual capital (hereinafter referred to as "IC") in management theory and business practice is among the dominant business development factors, and its importance has increased over the last decade. "In 2015, intangibles, also referred to as "intellectual capital", represented 87% of the market capitalization of listed companies forming part of the S&P 500 stock-market index; trademarks represent a large percentage of these assets, with expenditures on R&D often exceeding the net profits of these companies (Canibano, 2018). Recently, "technological progress, outsourcing, complex supply chains, and changing cultural values have propelled intangible asset value to more than 90% of the valuation of many companies" (Samonov, 2021). Investment in the creation of IC for businesses provides opportunities, and these statistics support this statement. Intangibles provide an opportunity but require a willingness to adapt.

The evolution of the research from measurement to impact analysis and quantitative research revealed that there are several contradictions and unanswered global issues in this area. Research on the efficiency of using the intellectual capital-related resources of companies or the costs of these resources, which are treated as investments, and their impact on the performance of companies and, in a broader sense, sectors, industries or groups of companies, is the next stage. As resources are limited, there is a need to use resources more efficiently and longer. The role of IC becomes crucial when a company or sector wants to increase competitiveness, acquire external financing, evaluate its impact or perform a comparative analysis between companies. The positive impact of IC has been investigated and proven to be positive overall in static models.

The missing component of the research is the analysis of the long-term dynamic longitudinal effect and segregated IC's component impact. The number of IC and performance indicators is growing, and the research findings are contradictory. There is a lack of longitudinal analysis and research on the control and moderate variables and normalization proxies, thus providing wide manoeuvres for research on IC component impact changes over time, including the significance, direction and sign of the impact. By 2023, the performance ratio has reached three hundred ratios according to numerous studies in this field. Therefore, the research questions to answer the business ratio side are what ratios to choose, how to group and, as an advanced approach, how to use integrated assessment and composite ratios.

The same questions arise on the intellectual capital side, as the number of intellectual capital components is growing and expanding. The human capital and structural capital components identified in the original research are accompanied by relational, innovation, social, protected, and business components, with many other components forming new meta-systems.

The current research faces several research questions:

- What ratios to choose for the analysis of the performance of companies with ratios of approximately 300 in the evaluation of the company available?
- How can performance indicators be grouped for different purposes and target groups?
- How can integrated assessment and composite ratios be used?
- What are the intellectual capital measures to use?
- How can the impact of IC on the performance of a company be evaluated?
- How long does it take to see the Intellectual Capital impact (longitudinal analysis)?
- How can normalization proxies for the intellectual capital variables, i.e., choosing between adjustment for assets, value added or sales revenue, be chosen?

Research Hypothesis: Intellectual capital has a systemic and significant effect on business performance.

Statements to be defended:

- Each component of intellectual capital has a systemic and significant effect on the performance of strategic and investment business performance and its composite.
- The components of intellectual capital are affected by changes over time, including the significance and direction of the impact.

The scientific contributions of the paper are as follows:

- Theoretical: a systematized, structured and expanded approach to evaluating the effectiveness of intellectual capital for a company's performance development.
- Methodological: Selected normalization proxies for the intellectual capital impact models, selected and extended ranges of moderate values and control values in the intellectual capital impact models, added composite ratios on the business performance side and improved the conceptual longitudinal models approbated in international research.
- Novelty at the Baltic country level: An assessment of the impact of intellectual capital has been carried out using Nasdaq Baltic data, which demonstrate new aspects of the research and unique results at the international level, and the unique database and data on the intellectual capital of the companies are used for the first time for comparative analysis in the Baltic region.

2. Literature Review. Researchers and practitioners have approved DuPont analysis (Heikal et al., 2014; Rupeika-Apoga & Saksonova, 2018; Kourtis et al., 2019; Pawirosumarto & Dini, 2018), hierarchical methods of analysis and others and continue to experiment with solutions to offer a panoramic view of the current financial situation of companies such as Nuan N.V. (2020). In the general case, the number of performance ratios can already reach several hundred, and extensive analyses of the ratios can be found in numerous books, for example, Ciaran Welsh, Roberts Higgins, and Stephen Bragg and articles (Firer, 2003; Guthrie et al., 2006, 2012; Lerro, 2014; Hussinki, 2018; Al-Dmour et al., 2019; Secundo, 2018; Hatamizadeh et al., 2020; Hussen, 2020). However, in practice, the use of a limited number of indicators is sufficient. Intellectual capital impact assessment has explored the number of research papers represented by (Lin, 2018; Nadeem et al., 2017; Pedro et al., 2018a, b; Scafarto et al., 2016; Kong & Prior, 2008; Torres, 2018; Wahyuni, 2019; Sardo & Serrasqueiro, 2017; Campos, 2018; Hutahayan, 2020), revealing research gaps and opportunities. The majority of related studies focus on profitability ratios, adjust for value added, and analyse the current period (Huan & Hang, 2020). A growing number of IC components and performance ratios, a lack of longitudinal analysis, and contradictions in the findings are engines for further research. Earlier methodologies address IC through two components only: human capital and structural capital (SC). Human Capital Efficiency (Edvinsson, 1997; Sveiby, 1997; Sobakinova et al., 2019; AlQershi et al., 2022; Mubarik et al., 2018; Biendebach et al., 2019; Aversano 2020). Human capital efficiency was first discussed in articles by Pulic (2000) in 2004 and 2008 and recognized as one of the crucial elements of analysis by numerous researchers. Some studies have modified and extended methods to address other IC components, which were neglected by the original approach, such as process capital (PrC (Process Capital)=Net Sales/Fixed Assets) (Scafarto et al., 2017), customer capital (Solovjova, 2018) and innovation capital (Ulum et al., 2018; Vishnu & Gupta, 2014; Bayraktaroglu et al., 2019; Tjahjadi, 2021). Nadeem et al. (2017) argued that, irrespective of geolocation, IC has considerable relevance to the financial performance of companies (Lentjusenkova & Lapiņa (2020)). Kamath (2017; Tiwari & Vidyarthi, 2018; Vrontis, 2021) revealed that IC significantly positively influences performance for Indian companies and Indonesia (Soewarno & Tjahjadi, 2020; Weqar, 2020). Radic (2018) reported similar results for Serbian banks. Xu & Li (2019) explored and compared the extent of intellectual capital (IC) and its four components in high-tech and nonhigh-tech SMEs operating in China's manufacturing sector and examined the relationship between IC and the performance of high-tech and nonhigh-tech SMEs. The findings of this paper reveal that there is a significant difference between high-tech and nonhigh-tech SMEs. The results further indicate a positive relationship between IC and the financial performance of high-tech and nonhigh-tech SMEs. Hapsah & Bujang (2019) reported that human capital contributed approximately 82% to IC, followed by structural capital (16%) and relational capital (1%). According to Bayraktaroglu et al. (2019), innovation capital efficiency has a moderating effect on the relationship between structural capital efficiency and profitability, meaning that, depending on an increase in R&D expenses, the effect of structural capital efficiency on profitability also increases. According to the results of the present study, return on assets is the dependent variable; although entering relational capital has not caused any significant change in R2 values (Whiting et al. 2019; Sharma, 2014; Dameri, 2021; Feng, 2021), the opposite has been shown to have a positive effect (Lopaciuk-Gonczaryk, 2019; Martini, 2019; Martín-Alcazar, 2019). One of the issues raised in (Masaro et al., 2019; Temouri, 2021; Vadi et al., 2019) is productivity and IC in knowledge-intensive

industries in aging societies and measures to sustain productivity targets. Xu & Liu (2020) showed that physical capital was the most influential factor for firm performance; human capital was viewed as a performance-enhancing measure; structural capital had no significant impact on firm performance; and innovation capital and relational capital hurt a firm's profitability. Al Momany et al. (2020) reported a positive relationship between the market-to-book ratio and earnings per share. For the market-to-book ratio, the result is a significant positive relationship, as for Gupta & Raman (2021). Concerning the components, the insignificant association between SC and firm performance has been the most debatable issue because of the difficulties associated with structural capital management and because balance sheets do not record all the elements of structural capital, which makes IC valuation even more difficult (Gallego et al., 2020). What is also discussable is standardizing all variables by the assets and formula of the process capital. To address these research gaps and opportunities, most studies focus on profitability ratios, adjust for value added, and analyse the current period. A growing number of IC components and performance ratios (Martín-de Castro, 2019) lack longitudinal analysis, and contradictions in the findings are engines for further research. The modification would be to use inverse relationships, add other types of IC capital to the model, choose normalization proxies, moderate and control variables, and perform longitudinal analysis in addition to static analysis.

3. Methodology and research methods.

The research tasks are as follows:

1) to develop the set of components of IC for use in the econometric model of the impact of IC on the efficiency of firms within the framework of the research;
2) to extract the target group for the research from an expanding body of targeted research on profit- and nonprofit-type organizations;
3) to filter performance indicators for strategic business analysis and investigate the performance of Nasdaq Baltic issuers;
4) to approbate the composite performance indicator rate of business success;
5) to select and expand the scope of IC ratios and elaborate on the conceptual model for the comparative analysis of the IC of organisations;
6) to expand and test the impact of IC on business performance models.

Data were used for all Baltic countries from Nasdaq Baltic and morning stars with no sampling. The data are reliable and legitimate. The author faces multiple issues with formats reported, no guidelines for the explanatory notes, missing data, no possibility to import and necessity to proceed manually, different currencies, etc. Nevertheless, the effort to collect, proceed, clean and code the information has resulted in a unique database to use for the research in impact models.

Research methods include comparative quantitative and qualitative analysis, descriptive statistical characteristics for quantitative data analysis, systematization of company performance indicators according to target groups, analysis of ratings and the integrated ratio, ordinary least square panel regressions and dynamic/longitudinal regression analysis. Given the limitations of the research, the set of performance indicators chosen by the author should not be considered complete. The selection is limited to monetary analysis, which uses public data available on the NASDAQ BALTIC companies within the period of 2012--2019. One of the major limitations is missing data or fragmented data provided by companies. The amount of information disclosed, as many companies fill the obligatory part as income statements and balance sheets but not much in the descriptive part, does not elaborate on costs, making it difficult to analyse information. Accounting and legislative rules and procedures are not the subjects of discussion in the research. Aware that the company's operations under modern management theory may depend on different factors, such as the company's business sector, size, country development level, economic cycle, enterprise life cycle, etc., by selecting control and moderate factors, normalization proxies and a common analysis approach, the authors select all companies listed in Baltics with no sampling, analysing all companies according to the ceteris paribus principle.

Regressions models, developed by the author, provide insights into intellectual capital's static and dynamic impact on business performance, segregating the IC factors, costs of its acquisition and maintenance, and testing for the three different proxies for the IC components' efficiency ratios, namely, assets, value added, and sales revenue:

$$PERF_{ti} = \beta_0 + \beta_1 HCti + \beta_2 RCti + \beta_3 PrCti + \beta_4 PCti + \beta_5 SC + \beta_6 InC \quad (1)$$

where PERF – performance ratio (ln sales rate), ROA, ROE, ROI, RBS, and E/S; HC – human capital; RC – relational capital; PrC – protected capital; PC – process capital; SC – social capital; InC – innovation capital; AGE – age control variable; SIZE – size control variable; LEV – leverage control variable; Dummy LV – Nasdaq Riga; Dummy LT – Nasdaq Vilnius; Dummy EST – Nasdaq Tallinn; Dummy main list – Issuers in Nasdaq Main list; Dummy industry 1…n – Dummies for each NACE industry; T – current period; I – Nasdaq emitent; and $\varepsilon i,t$ is the residual error; $lnAGEi_{it}$, $lnSIZE_{it}$, LEV_{it} – control variables; country, industry, main or secondary list – moderating variables.

The calculation of variables mostly uses the IC component, and the majority of authors have adjusted Personnel Costs to added value. In the case of negative value added, the author also offers sales revenue and assets as alternatives.

$$Human\ Capital\ = \frac{Personnel\ Cost}{Sales\ Revenue} or\ \frac{Personnel\ costs}{Value\ Added}\ or\ \frac{Personnel\ costs}{Assets} \quad (2)$$

To standardize the proxy for the measurement of relational capital, marketing and sales costs are used as customers and stakeholders:

$$Relational\ capital\ = \frac{RC}{Sales\ Revenue} = \frac{Marketing\ costs}{Sales\ Revenue}\ or\ \frac{Marketing\ costs}{Value\ added}\ or\ \frac{Marketing\ costs}{Assets} \quad (3)$$

The best proxy for innovation capacity is research and development (R&D) expenditure.

$$Innovation\ capital\ = \frac{InC}{Sales\ Revenue} = \frac{R\&D}{Sales\ Revenue}\ or\ \frac{R\&D}{Value\ Added}\ or\ \frac{R\&D}{Assets} \quad (4)$$

Protected capital integrates legally protected rights, including licences and patents.

$$Protected\ capital\ = \frac{PR}{Sales\ Revenue} = \frac{Trademark\ value+patent\ costs+copyright+industrial\ design+intangible\ assets}{Sales\ Revenue\ or\ Value\ Added\ or\ Assets} \quad (5)$$

Composite process capital combines expenditures on top management and IT.

$$Process\ capital = \frac{PC}{Sales\ Revenue} = \frac{IT + Board\ salary}{Sales\ Revenue\ or\ Value\ Added\ or\ Assets} \quad (6)$$

Social capital can be measured as relations with third parties that make them loyal to business.

$$Social\ capital\ = \frac{SC}{Sales\ Revenue} = \frac{Donations\ and\ Financial\ Support}{Sales\ Revenue\ or\ Value\ Added\ or\ Assets} \quad (7)$$

The extensive analysis of the control variables has led to the top three selections that have unambiguous effects on the business performance of the business entity:

1) Levi, t – leverage calculated as the natural logarithm of the ratio of the book value of total debt to total assets;
2) SIZEi, t - size, calculated as the natural logarithm of total assets;
3) AGEi, t - enterprise's age, calculated as the natural logarithm of the number of years of operations of the company.

In addition, three criteria moderate the relationship, and these are the Nasdaq Baltic lists, which have different requirements for emitents, countries of origin and industry codes (NACEs). As the performance variables are ratios, we have to normalize the IC components. The research questions are what to choose for normalization; according to the research, there are several options, including assets, value added, or sales revenue.

Lagged values must be added for periods t-1 and t-2. The longitudinal intellectual capital monetary impact analysis extends and summarizes the results by adding composite ratios, noise-diminishing variables and a dynamic approach, which provides added value and significant contributions to the mathematics and

efficiency of the existing models. Owing to inconsistent and unregulated reporting in the Notes to Financial Statement, panel data, both time series and cross-sections, were cleaned, structured, and harmonized; for example, currencies converted as reports were still in litas for Lithuania for some years and some in Europe, for example, outliers identified before the impact models were applied (Anifowose et al., 2018).

The first approach tests every period for every normalized group for assets, sales revenue, and value added; selects the most significant ones; and defines the final model. The second approach to select the variables and proxies for them is to test the effect of each variable in period t-1 or period t-2 on the dependent variables selected. Repeating the analysis for each independent variable on the dependent variable and narrowing the impact analysis to the restricted number of variables, the most significant variables are identified among the independent proxies in periods t, t-1 and t-2. Finally, the summary panel data analysis includes all variables identified as significant at all steps. Comparing the two approaches, one was selected for the analysis of the impact of intellectual capital on business performance by evaluating other selected business performance strategies and investment ratios.

A similar procedure was applied to the panel data analysis for all business performance indicators, return on assets, return on investments, the price–earnings ratio, the market-to-book value, and the rate of business success. It also helps answer the research question: How can normalization proxies, i.e., adjusting for assets, value added, or sales revenue, be chosen? The two approaches are tested, and both methods prove that it is better to adjust for assets. The second approach results in more significant variables, both intellectual capital and control, moderate variables, and better model fit.

The list of data collected is eighty-four data items for each of the two nighty companies from Latvia, Lithuania and Estonia listed at Nasdaq Baltic that were later used in calculations. The whole sample was used, and no sampling was attributed. Companies have obligatory requirements to publish yearly reports on the Nasdaq webpage. All the data are in PDF files, and as the majority of the data were obtained from the annex to the annual reports "Notes to financial statement", which is the choice of the company to include and explain, and there is no standard format, the data were collected manually and adjusted accordingly. All the data are in PDF text files, and as the majority of the data were obtained from the annex to the annual reports, "Notes to financial statement", which is the choice of the company to include and explain, and there is no standard format. The data were collected manually and adjusted accordingly (Annex 1 – Data collected). For the analysis of the impact of IC, selected performance indicators used in internationally conducted research and business analysis were utilized. The set of performance indicators chosen by the author should not be considered complete. The selection is limited to the monetary analysis used for strategic and investment analysis. Business performance ratios and IC components, moderate and control variables and normalization proxies are the only ones that can be measured in monetary terms.

Limitations of the research. The name of the thesis is the impact evaluation of IC on business performance, which defines the first limitation of the research, i.e., the target group definition—business entities. Government institutions, public organisations and NGOs are excluded from the research. For the analysis of the impact of IC, selected performance indicators used in internationally conducted research and business analysis were utilized. The set of performance indicators chosen by the author should not be considered complete. The selection is limited to monetary analysis. Business performance ratios and IC components, moderate and control variables and normalization proxies are the only proxies that can be measured in monetary terms.

The public data used are available from *Nasdaq* companies in Latvia, Lithuania and Estonia from 2012--2019, i.e., the prepandemic years and 2020, when the econometric analysis of the manually selected data was initiated. One of the major limitations is missing data or fragmented data provided by companies. The amount of information disclosed, as many companies fill the obligatory part as income statements and balance sheets but not much in the descriptive part, does not elaborate on costs, making it difficult to analyse information.

Accounting and legislative rules and procedures are not the subjects of discussion in the research. Aware that the company's operations under modern management theory may be influenced by a wide variety of factors, such as the company's business sector, size, country development level, economic cycle, enterprise life cycle, etc., by selecting control factors and a common analysis approach, the authors avoid the risk of interpreting influencing factors by analysing all companies according to the ceteris paribus principle.

4. Results. Numerous regressions for both methods, different proxies, time lags, experiments with control and moderate variables, and whole-spectrum ratios on both intellectual capital and business performance, including composite ratios, were run. The main purpose was to limit the impact on the particular investment and strategic ratio and test the hypothesis on the impact of the IC on each selected business performance

indicator, taking into account the dynamic time effect and approbations of added control and moderate variables adjusted for the normalization proxies selected.

Research allows us to filter out particular components of IC that have an impact on predefined business performance ratios in different time periods and make conclusions that can be used to make investment and strategic resource planning decisions. When the variables are selected, the author excludes nonsignificant variables from the results in Table 1. "IC impact on ln sales in period t, revenue proxies, Baltic Nasdaq Issuers, Latvia, Lithuania, Estonia, 2012–2020", and the results are presented in Table 2. "IC impact on ln Sales in period t, revenue proxies, shortlisted, Baltic Nasdaq, Latvia, Lithuania, Estonia, 2012 – 2020".

Table 1. IC impact on ln sales, current year

Parameter	B	Standard Error	t	Sig.	NP	Observed Power
Intercept	2.334	1.023	2.282	0.024	2.282	0.735
List	0.389	0.165	2.357	0.020	2.357	0.759
Age_ln	0.374	0.277	1.347	0.180	1.347	0.382
Size_ln	0.644	0.055	11.641	0.000	11.641	1.000
Lev_ln	0.010	0.041	0.249	0.804	0.249	0.110
RC	1.178	0.714	1.651	0.101	1.651	0.500
HC	-0.970	0.426	-2.275	0.024	2.275	0.733
PC	4.802	1.465	3.278	0.001	3.278	0.947
PrC	0.128	0.385	0.331	0.741	0.331	0.118
[Country=1]	0.647	0.153	4.224	0.000	4.224	0.995
[Country=2]	0.022	0.194	0.112	0.911	0.112	0.102

Sources: developed by the authors.

Human capital and protected capital are not significant in period t. In period t, adjusting for sales revenue, all variables except Latvia as a country dummy are significant, with an adjusted R squared of 0,639.

Table 2. IC impact on sales: significant variables only

Parameter	B	Standard Error	t	Sig.	Noncent. Parameter	Observed Power
Intercept	1.577	0.459	3.433	0.001	3.433	0.962
List	0.387	0.143	2.709	0.007	2.709	0.855
Size_ln	0.795	0.041	19.255	0.000	19.255	1.000
RCE	2.086	0.597	3.492	0.001	3.492	0.967
PCE	8.942	1.117	8.004	0.000	8.004	1.000
[Country1]	0.726	0.123	5.890	0.000	5.890	1.000

Sources: developed by the authors.

The IC impact assessment indicates that ln sales or revenue sales growth is positively dependent on the control variables SIZE of the company, relational capital (costs of marketing and sales in the current period), and the moderate variable List, which is the first Nasdaq Baltic list. Process capital indeed has a negative impact in the current year, indicating that the costs of IT and board salaries in the current period may not have a positive impact and must be checked for different proxies and periods. The intercept is also positive and significant, indicating that other factors in addition to intellectual capital influence ln sales. Therefore, an Estonian large company from the first Nasdaq Baltic list heavily spending on marketing and sales boosts sales revenue growth in period t. In period t-1, procedures with a full regression and shortcut version excluding nonsignificant variables from the analysis with the impact of the t-1 period variable son period t sales revenue growth are repeated.

Table 3. IC impact on sales in the next year

Parameter	B	Standard Error	t	Sig.	Noncent. Parameter	Observed Power
Intercept	1.695	0.495	3.423	0.001	3.423	0.961
List	0.439	0.158	2.772	0.006	2.772	0.868
Size_ln	0.778	0.045	17.423	0.000	17.423	1.000
RC_1	2.188	0.666	3.284	0.001	3.284	0.948
[Country=1]	0.715	0.135	5.284	0.000	5.284	1.000

Note: R Squared = 0.791 (adjusted R squared = 0.786)

Sources: developed by the authors.

In period t-1 (see Table 3 "IC impact on sales next year"), process capital in the previous period (t-1) appears to be significant along with the control size (Size ln) and list variables. Narrowing down the number of independent variables, the model for the period t-1 variable impact on t period sales growth identifies marketing and sales costs as having a positive impact. In addition, [Country=1], which is Estonia, has statistical significance (p value of 0.000). As in period t, first, Nasdaq Baltic listed companies and large companies are most likely to increase the sales growth rate. The same regression is run for the impact of the period t-2 IC components on period t ln Sale.

Table 4. IC impact on sales two years after

Parameter	B	Standard Error	t	Sig.	Noncent. Parameter	Observed Power
Intercept	1.755	0.567	3.095	0.002	3.095	0.925
List	0.538	0.185	2.913	0.004	2.913	0.896
Size_ln	0.767	0.051	14.915	0.000	14.915	1.000
RCE_2	1.999	0.766	2.609	0.010	2.609	0.830
[Country=1]	0.673	0.160	4.200	0.000	4.200	0.994

Sources: developed by the authors.

Summarizing the tests, the normalization proxy adjusting IC capital to sales revenue shows a relatively high and significant model (R squared = 0.758 (adjusted R squared = 0.751)), clearly indicating the size of the company, affiliation with the first Nasdaq Baltic list, and registration in Estonia as favourable control and moderate factors behind the revenue sales growth rate in addition to the intellectual capital variables. Relational capital, expressed as marketing and sales costs in all periods, has a positive effect on Ln sales and process capital, including the costs of IT and the board motivation scheme, which are negatively correlated with the revenue sales growth rate in period t.

Adjusting for value added might add complexity to the analysis, as in the case of sales revenue, one might expect a correlation with sales revenue growth. Compared with the adjustment for sales revenue, the extended model indicates that a full spectrum of IC variables is significant and that the adjusted R squared is greater. The value-added normalization proxy increases the quality of the model, filtering human capital as capital that has a significant effect in addition to relational capital and process capital. Additionally, the list of control and moderate variables in the case of the adjusted value-added model is enriched by the leverage factor, which is positive and significantly predicts future success.

The third option is to adjust the IC variables for the assets. The conclusion is that normalization proxies for assets allow us to prove that all the significant variables have a significant and positive effect on sales revenue growth as a business performance indicator. The value-added proxy model allows us to prove the positive impact of Relational and Process Capital and adds leverage as a significant variable explaining the impact. The sales revenue proxy proves that only relationship capital has a positive effect. Additionally, two control variables—affiliation with the first list of Nasdaq Baltic and size of the company and registration of the company in Estonia—were significant in all the models.

Companies in the first Nasdaq Baltic list have higher ROA that can be explained by the requirements. The size of the company matters. The same is true for leverage. As expected, relational capital, i.e., the costs of marketing and sales, has a significant and positive effect on ROA. Return on equity, which analyses the effect of intellectual components, is dependent on previous year expenditures on marketing, sales and relational capital. Importantly, the mathematics of the models prove that the component shows the best fit when adjusted for the assets compared with value added (which can also be negative in the number of cases) and sales revenue as a normalization proxy. The significance of protected capital (intangible recourses patented, licenced and obtained) at 0.05 is observed for the current and t-1 periods. Repeated and systemic positive impacts on the number of business performance indicators can be observed for spending on digitalization and Board members both in the current and previous operational years. Adjusting for value added strongly influences the model fit and quality. Again, the first list of Nasdaq Baltic shows a stronger correlation of the variables. Repeatedly, the return on investments in Baltic countries for the companies listed in Nasdaq Baltic clearly impacts business performance, paying dissent salaries for board members and investing in IT systems and processes both in the current and previous periods at 0.05 significance. The costs of relational capital for the return-to-investment ratio do not have a significant effect. R&D capital did not appear significant in Baltics, which can be explained by the limited amount of R&D, as most of the companies are branches of international companies, and most investments are made in mother companies.

5. Conclusions & Discussions. For the analysis of the impact of IC, selected performance indicators used in internationally conducted research and business analysis were utilized. The set of performance indicators chosen by the author should not be considered complete. The selection is limited to the monetary analysis used for strategic and investment analysis. Business performance ratios and IC components, moderate and control variables and normalization proxies are the only proxies that can be measured in monetary terms. Meta-analysis of intellectual capital structure updates, choices and approbations of intellectual capital components improved by the selection of normalization proxies and selected and extended ranges of moderate values and control values in intellectual capital impact models, improving the conceptual models approbated in international research. Summarizing the tests, the normalization proxy adjusting IC capital to sales revenue shows a relatively high and significant model (R squared = 0.758 (adjusted R squared = 0.751)), clearly indicating the size of the company, affiliation with the first Nasdaq Baltic list, and registration in Estonia as favourable control and moderate factors behind the revenue sales growth rate in addition to the intellectual capital variables. Relational capital, expressed as marketing and sales costs in all periods, has a positive effect on Ln sales and process capital, including the costs of IT and the board motivation scheme, which are negatively correlated with the revenue sales growth rate in period *t*.

The conclusion is that normalization proxies for assets allow us to prove that all the significant variables have a significant and positive effect on sales revenue growth as a business performance indicator. The value-added proxy model allows us to prove the positive impact of Relational capital (adjusted for marketing and sales costs) and Process capital and adds leverage as a significant variable explaining the impact. The sales revenue proxy proves that only relationship capital has a positive effect. Additionally, two control variables—affiliation with the first list of Nasdaq Baltic and size of the company and registration of the company in Estonia—were significant in all the models. ROA is significantly influenced by costs of marketing and sales in the previous year, especially for large and mature companies from the first Nasdaq Baltic emitent list, with requirements for the turnover of shares and min turnover of at least 3 mln EUR. To increase return on equity, the model proves that business units have invested heavily in sales and marketing (adjusted to assets as a quality fit) in the year before, IT systems and Board salaries as motivations (adjusted for value added as a quality fit) two years in a row and invested/protected assets such as know-how and patents (adjusted to sales revenue as the quality fit). Adding significance to the first Nasdaq list as a company's characteristic provides clear guidelines for companies to work on increasing ROE on the intellectual capital side. The return of investments strongly correlated with the costs of IT systems and Board salaries in the previous and current years. There is no impact on the P/E ratio. R&D capital did not appear significant in Baltics, which can be explained by the limited amount of R&D, as most of the companies are branches of international companies, and most investments are made in mother companies. Research restrictions present possible opportunities and indicate directions for future research, widening the analysis to include nonmonetary data, expanding the list of components and variables, and deepening accounting and financial primary and secondary data analysis.

Government institutions in cooperation with industry associations/chambers of commerce and Nasdaq Baltic in all three Baltic states can reassess reporting recommendations on intellectual capital, including intangible assets, and its components, broadening the scale beyond intangible assets to include social capital, human capital, etc., clearly defining the structure of the components and taking into account the experience of other countries working on mandatory and voluntary reporting on IC. Moreover, impact analysis at the national level and microlevel of companies, as well as industry-level research, can contribute to defining the development and sustainability strategy of the economy. Nasdaq Baltic and Nordic, in cooperation with Morningstar, a leading provider of independent investment research, has introduced a company fact sheet to increase investor awareness for publicly traded SMEs. The initiative could be extended to make these 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.

An elaborate approach to systematizing the impact of IC on the performance of a company can be used both in Latvia and in other countries around the world; this approach could be used to support and purposefully develop a policy for effective use of the IC and other resources of the company, as well as planning, investing, comparative analysis and decision-making processes. The elaborated approach to measuring IC and estimating impact can be employed to build the mid-term development strategy of enterprises and industries provided that sufficient data are available from all units of the enterprise or all enterprises in the industry. Such a new perspective of analysis can provide a competitive edge to an enterprise, a cluster, or an industry seeking to improve its output, sales or profitability.

The name of the thesis is the impact evaluation of IC on business performance, which defines the first limitation of the research, i.e., the target group definition—business entities. Government institutions, public organisations and NGOs are excluded from the research. For the analysis of the impact of IC, selected performance indicators used in internationally conducted research and business analysis were utilized. The set of performance indicators chosen by the author should not be considered complete. The selection is limited to monetary analysis. Business performance ratios and IC components, moderate and control variables and normalization proxies are the only proxies that can be measured in monetary terms.

Recommendations for further research include expanding the range of component measurements and using them in models, testing aggregate indicators in impact models, expanding geography, increasing the number of companies, developing a reporting standard, and promoting the provision of new information at the Nasdaq level for research.

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Вплив маркетингу, продажів та інновацій на ефективність функціонування бізнесу в дослідженнях інтелектуального капіталу: Латвія, Естонія та Литва

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Компоненти метасистеми інтелектуального капіталу (ІК) значно розширилися за останнє десятиліття, після чотирьох десятиліть еволюції досліджень інтелектуального капіталу, які супроводжувалися активними дискусіями щодо визначень, методів вимірювання, звітності та аналізу впливу. Еволюцію досліджень ІК поділено на чотири етапи, хоча межі між ними є досить розмитими, а обмін ідеями стрімко зростав у всіх напрямках з кінця 1990-х років. Теорія інтелектуального капіталу розвинулася на основі ресурсного та компетентнісного підходів. Термін "інтелектуальний капітал" з'явився в 1990-х роках і по суті збігся з концепцією нематеріальних активів. Автори підкреслюють, що такі терміни, як "нематеріальні активи", "торговельна марка", "репутація" та "інтелектуальна власність", використовувані в бухгалтерському обліку, не охоплюють усі аспекти, які мають входити до цієї концепції. Зокрема, не враховується використання нематеріальних активів як об'єкта управління для підвищення вартості компанії шляхом залучення раніше невикористаних резервів, таких як знання, інформаційні технології, задоволеність клієнтів тощо. Чітко визначеної термінології не існує, тому є певна гнучкість у використанні термінів. У рамках цього дослідження було сформовано вибірку на основі даних бази Morningstar та емітентів Nasdaq Baltic у Латвії, Литві та Естонії за допандемічний період 2012–2019 років. Для перевірки гіпотез дослідження було застосовано поздовжній регресійний аналіз. Результати підтвердили, що реляційний капітал, виміряний через маркетингові та збутові компоненти з використанням проксі-показників активів, доходу від продажу та доданої вартості, має значущий та позитивний вплив на показники ROA, ROE, ROS та RBS. Водночас, він не впливає на співвідношення ціни до прибутку публічних компаній Балтійського регіону. Дослідження також підтвердило існування шести факторів, які впливають на показники ефективності функціонування бізнесу, з різними рівнями значущості, напрямками впливу та часовими рамками. Тестування різних контрольних змінних дозволило виявити нові аспекти впливу використання ресурсів на загальну ефективність бізнесу. Одночасно, спрощення моделі за допомогою агрегованих коефіцієнтів з обох сторін рівняння створило передумови для оптимізації моделей впливу.

Ключові слова: країни Балтії; інноваційний капітал; інтелектуальний капітал; поздовжній аналіз впливу; маркетинг; реляційний капітал; продажі.