

**INTELLECTUAL CAPITAL IN THE LISTED COMPANIES OF THE BALTIC STATES****Irena MAČERINSKIENĖ**[irena.macerinskiene@mruni.eu](mailto:irena.macerinskiene@mruni.eu)Mykolas Romeris University, Ateities str. 20,  
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**Abstract:** The theory of intellectual capital is vast and there are various angles and approaches to investigate it. Nowadays scientific publications about the intellectual capital have flooded academic journals, so this stage of the development of intellectual capital can be called “The intellectual capital era”. Nevertheless, there are so many opinions about it that it becomes difficult to investigate intellectual capital in a consistent and thorough way. The main issue arises in the evaluation of intellectual capital. This article is designed in order to provide a unified intellectual capital description, its structure and the methodology of intellectual capital evaluation. The main approach of this scientific research is regarding the listed companies of the Baltic States. The aggregated intellectual capital index is calculated for the listed companies of the Baltic States and the main tendency of its influence on market value. In addition to this, main factors that have an impact on the market value of the listed companies of the Baltic States are revealed.

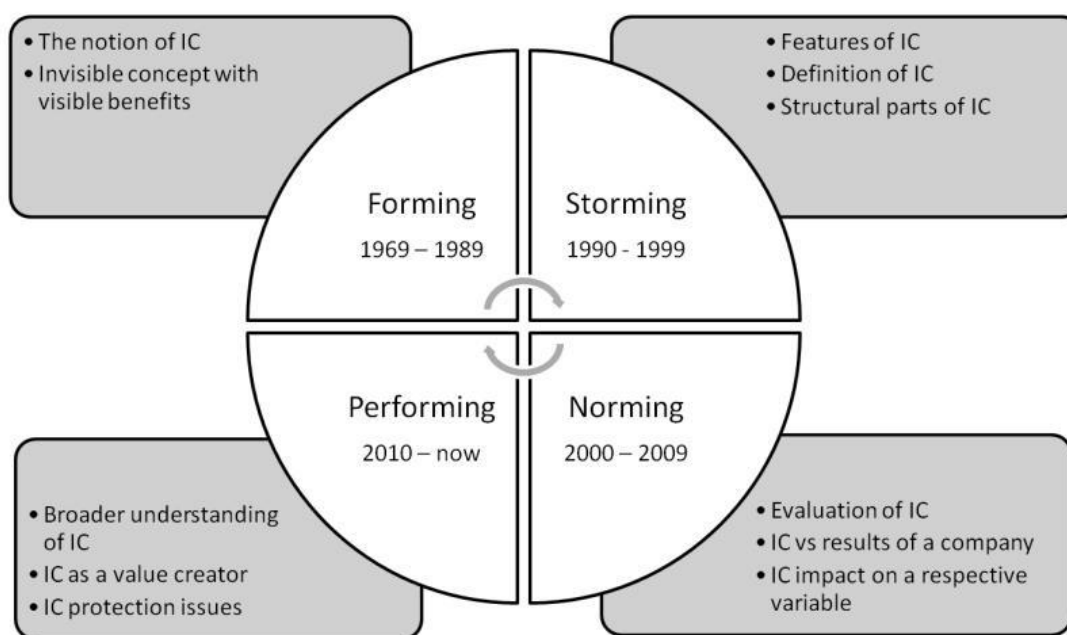
**Keywords:** intellectual capital; human capital; structural capital; juridical capital; relational capital; market value

## Introduction

Nowadays the most frequent goal of successful leaders of various companies is to gain a competitive advantage and to use as little funds as possible. Although the concept of intellectual capital has been widely investigated for the last decade, but it still does not have a common widely used description nor structure or assessment method. The concept of intellectual capital is popular amongst scientists as it is a complex, dynamic, multi-criteria object that definitely adds value and positive results are observed in the majority of studies (Roos & Roos, 1997; Stewart, 1997; Edvinsson & Malone, 1997; Sullivan, 1998; Taylor, 1998; Bontis, 1998; Nahapiet & Ghoshal, 1998; Bukh & Johanson, 2003; Bozzolan et al., 2003; Firer & Williams, 2003; Riahi-Belkaoui, 2003; Guthrie et al., 2004; Chen et al., 2005; Sanchez & Elena, 2006; Shiu, 2006; Zhang et al., 2006; Peng et al., 2007; Sonnier et al., 2007; Boesso & Kumar, 2007; Sonnier, 2008; Whiting & Miller, 2008; Ting & Lean, 2009; Yi & Davey, 2010; Zéghal & Maaloul, 2010, 2011; Alcaniz et al., 2011; Rashid et al., 2012; Rahman, 2012; Branswijck & Everaert, 2012; Molodchik et al., 2012; Cricelli, Greco & Grimaldi, 2013; Beattie & Smith, 2013; Bontis et al. 2015; Nimtrakoon, 2015; Bini et al., 2016; Sachpazidu-Wójcicka, 2017; Vlacseková & Mura, 2017). In the modern world, intellectual capital has become one of the most valuable assets of an organization, region or state (Markhaichuk & Zhuckovskaya, 2019, p. 90). There are various approaches regarding company's intellectual capital, its main structure, features. Many researchers use multiple methods to assess intellectual capital and the impact it has on a firm's market value. That is why *the research problem* of this article is how to assess company's intellectual capital and what impact it has on its market value. *The object* of the research is the impact of a respective company's intellectual capital on its market value. *The purpose* of the article is as follows: to examine various scientific approaches of the company's intellectual capital and to assess its impact on the market value. What is more, *the aim* of this article is to check and test the effectiveness of the abovementioned model using an example of the Baltic States listed companies. Methods used for the research are as follows: expert evaluation, exploratory factor analysis, a pair-wise multiple correlation, and regression analysis.

### **Theory of intellectual capital and its influence on market value**

Nowadays there are numerous concepts related to the word “intellectual”: intellectual property, intellectual tools, intellectual approach, intellectual challenges, intellectual debates, intellectual enquiries, and even intellectual jokes. The main goal of company owners is to concentrate on intellectual capital, but the concept itself is not yet developed in a unified and harmonised way. It can be noted that the theory of intellectual capital can be divided into four main stages according to the features and research methodologies being used by various scientists (Figure 1).



Source: Mačerinskienė and Survilaitė, 2019

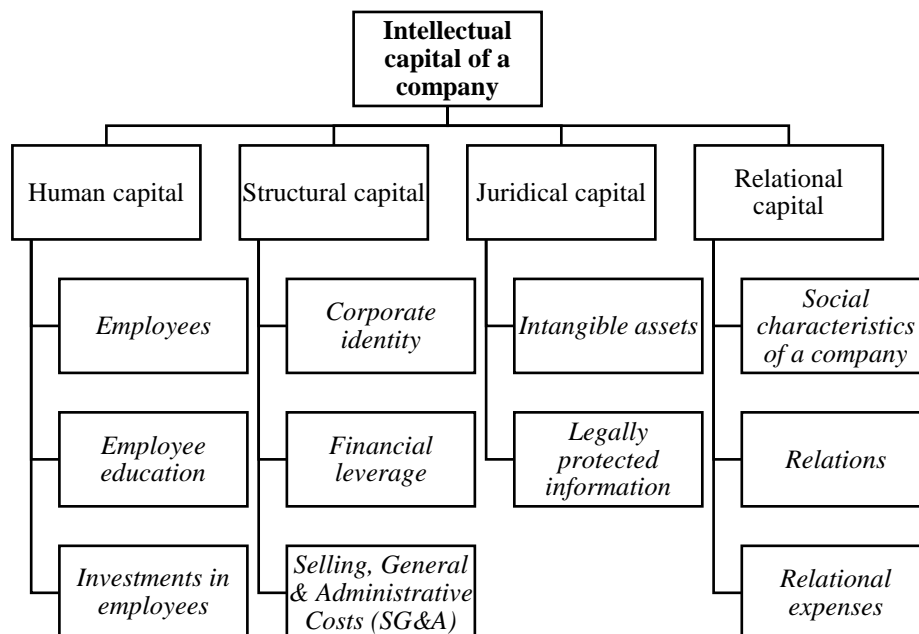
Figure 1. The development stages of the Intellectual Capital concept

The figure demonstrates the grouping of scientific literature regarding intellectual capital and main criteria of its formation. It was built on own assumptions based on Tuckman’s (1965) group/team formation theory stages. The initial stage can be considered as the notion of intellectual capital, the appearance of the concept itself in 1969 when Galbraith mentioned it for the first time in an email to Michael Kalecki. A couple of years later, Cooper and Sherer (1984) started to discuss the criteria of a concept that is invisible, but provides visible benefits. The figure shows how the research regarding intellectual capital changed during the years and the major findings that researchers were able to publish.

The main difficulty lies in defining intellectual capital in an appropriate and thorough way. Many researchers accentuate different features of intellectual capital and there is a vast theory about this matter. Depending on the type of research, intellectual capital can be investigated using the

accounting approach, where intellectual capital of a company is captured in balance sheets and other financial statements (Dumay & Cuganesan, 2011; Dameri & Ricciardi, 2015; Dumay, 2016; Rahman, 2012; Nimtrakoon, 2015). Other authors state that intellectual capital is a strategic part of every company as it is the total amount of knowledge that exists in a company (Ulrich, 1998; Kaplan & Norton, 2001). However, another group of authors (Vaičekuskaitė, 2014; Low et al., 2015) suggest that intellectual capital is produced in universities and their main goal is to teach society and managers to use it in an effective and efficient way. Economists (Stewart, 1997; Edvinsson & Malone, 1997; Daum, 2003; Cezair, 2008; Wang, 2008; Nam & Pardo, 2011; Rahman, 2012; Mention & Bontis, 2013; Strong, 2014; Adams, 2015; Flower, 2015; Nimtrakoon, 2015; Dumay, 2016) in turn accentuate that intellectual capital is the tool of asset creation, knowledge, information, intellectual property, experience and other elements that are used in a company to have a competitive advantage.

It is proposed (Mačerinskienė & Survilaitė, 2019) that company's intellectual capital can be described as the aggregate of intangible resources a company has at its disposal that enables a company to operate at its best, creates a competitive advantage and increases market value. In this scientific paper it is suggested that intellectual capital of the company consists of four main structural parts: *human capital*, *structural capital*, *juridical capital*, and *relational capital*. The main elements are presented in the figure below (Figure 1).



Source: Mačerinskienė and Survilaitė, 2019

Figure 2. The structure of the intellectual capital of a company

To sum up, it depends what type of intellectual capital structure is being chosen for the research. Many authors investigate intellectual capital concept in various ways and there is no unified description, main structure, and features. Depending on the sector, type, size of the company different approaches can be used to investigate company's intellectual capital. The following sections of this article provide the methodology on how to investigate company's intellectual capital and how to assess the impact of intellectual capital on a company's market value.

### **Methodological approach of the evaluation of intellectual capital**

Intellectual capital of any respective company is a complex, dynamic, and diverse multi-criteria variable that does not have any widely accepted and unified assessment methodology. In this scientific article it is proposed to use intellectual capital structural parts' approach by composing an aggregated intellectual capital index. In order to do that, an aggregated index of every structural part should be calculated: human capital, structural capital, juridical capital, and relational capital. The question arises: how to evaluate each specific intellectual capital structural part? Scientific literature review revealed that different authors suggest various indicators for each intellectual capital structural part. In order to choose the most appropriate ones the following principles were applied (Pakalniškienė, 2012; Užienė, 2014): *frequency*, *objectivity*, *comparability*, *publicity*, *same methodology of calculation*, and *repeatability*. Indicators that are confidential, any subjective criteria were not included in the research (for instance: emotional intelligence, employee satisfaction, motivation, abilities, competences and skills, ability to deal with crises, reputation, personal relationships of top management, etc.).

**Human capital indicators** that were selected for further research are as follows: *number of employees* (Hall, 1992; Edvinsson & Malone, Skandia, 1997; Roos et al., 1998; Sveiby, 1997; Luthy, 1998; Andriessen, 2004; Huang & Liu, 2005; Dalkir et al., 2007; Peng et al., 2007; Huang & Wang, 2008; Baiburina & Golovko, 2008; Nogueira et al., 2010; Huang & Wu, 2010; Shakina & Barajas, 2012, 2014; Branswijck & Everaert, 2012; Molodchik et al., 2012); *education of employees* (Edvinsson & Malone, Skandia, 1997); *productivity of employees* (Edvinsson & Malone, 1997; Fox

et al., 2001; Peng et al., 2007; Ahangar, 2010; Shakina & Barajas, 2012, 2014; Molodchik et al., 2012; Branswijck & Everaert, 2012; Liang et al., 2013; Cricelli, Greco & Grimaldi, 2013); and *personnel costs* that consists of two main indicators: *expenses per employee* and *proportional costs of employee* (Edvinsson & Malone, Skandia, 1997).

**Structural capital indicators** that were selected for further research are as follows: *financial leverage* – Nasdaq OMX Baltic indicator calculated for all Baltic States' companies according to the same methodology (Edvinsson & Malone, Skandia, 1997; Poletti, 2003; Riahi-Belkaoui, 2003; Huang & Liu, 2005; Liang et al., 2011; Branswijck & Everaert, 2012; Molodchik et al., 2012; Shakina & Barajas, 2014); *Selling, General & Administrative (SG&A)* – Nasdaq OMX Baltic indicator calculated for all Baltic States' companies according to the same methodology (Edvinsson & Malone, Skandia, 1997; Peng et al., 2007; Branswijck & Everaert, 2012; Molodchik et al., 2012; Cricelli, Greco & Grimaldi, 2013); *company's identity* that consists of two main indicators: *company's age* (Edvinsson & Malone, Skandia, 1997; Huang & Wang, 2008; Huang & Wu, 2010; Branswijck & Everaert, 2012; Molodchik et al., 2012; Shakina & Barajas, 2014) and *strategy implementation* (Edvinsson & Malone, Skandia, 1997; Tseng & Goo, 2005; Peng et al., 2007; Kamukama et al., 2010; Shakina & Barajas, 2012, 2014; Branswijck & Everaert, 2012; Molodchik et al., 2012; Cricelli, Greco & Grimaldi, 2013; Chang et al., 2014).

**Juridical capital indicators** that were selected for further research are as follows: *intangible assets* (Edvinsson & Malone, Skandia, 1997; Sellers-Rubio & 'Ibez, 2007; Shakina & Barajas, 2012, 2014; Branswijck & Everaert, 2012; Molodchik et al., 2012; Cricelli, Greco & Grimaldi, 2013); *legally protected information* that was treated as *the number of patents, licences, trademarks* – information was used from the European Patent Office, patent information from the website: <https://worldwide.espacenet.com/> and trademark information from the website: <https://euipo.europa.eu/eSearch/> (Edvinsson & Malone, Skandia, 1997; Tseng & Goo, 2005; Sellers-Rubio & 'Ibez, 2007; Shakina & Barajas, 2012, 2014; Branswijck & Everaert, 2012; Molodchik et al., 2012; Cricelli, Greco & Grimaldi, 2013); and *characteristics of the company* that consists of two main indicators: *location in the capital* (Shakina & Bykova, 2011; Shakina & Barajas, 2012, 2014; Branswijck & Everaert, 2012) and *number of subsidiaries* (Edvinsson & Malone, 1997, Skandia, 1997; Shakina & Barajas, 2012, 2014; Branswijck & Everaert, 2012; Molodchik et al., 2012; Cricelli, Greco & Grimaldi, 2013).

**Relational capital indicators** that were selected for further research are as follows: *relational expenses* that are treated as marketing, advertising, representation expenses (Edvinsson & Malone, Skandia, 1997; Gleason & Klock, 2003; Chen et al., 2005; Sussan, 2012; Branswijck & Everaert,

2012; Molodchik et al., 2012; Shakina & Barajas, 2014; Cricelli, Greco & Grimaldi, 2013) and *dissemination of company's awareness* that consists of three main indicators: *social networks* – evaluation of the social networks the respective company is developing: the company is assigned 1 point for each active account (Poyhonen & Smedlund, 2004; Osman-Gani & Rockstuhl, 2008; Stroppa & Spieß, 2011; Cricelli, Greco & Grimaldi, 2013; Pinto & Araujo, 2016); *company's website quality* – it is evaluated as the total amount of points that a respective company's website receives for the following criteria: 1) availability of information to investors; 2) multilingual website or not; 3) amount of information (more than 5 web pages with active links); 4) design (Shakina & Bykova, 2011; Shakina & Barajas, 2012, 2014; Branswijck & Everaert, 2012; Molodchik et al., 2012), and *citations in search engines* – the website as follows: [www.prchecker.info/check\\_page\\_rank.php](http://www.prchecker.info/check_page_rank.php) is used for the evaluation of a respective company, for instance: Agrowill group – 4 out of 10 (Shakina & Barajas, 2012, 2014; Everaert, 2012; Molodchik et al., 2012).

All four aggregated intellectual capital structural parts' indexes are calculated using exploratory factor analysis. The data was collected using Latvian, Estonian, and Lithuanian companies that are listed in Nasdaq Baltic stock exchange. At the time of analysis there were 27 Latvian companies, 17 Estonian companies, and 28 Lithuanian companies listed in Nasdaq Baltic stock exchange. Five years data was collected for the period from 2011 to 2015 as more recent data were not available. Moreover, some of the listed companies (“LHV Group”, “Linda Nektar”, “Pro Kapital Grupp”, “Baltic Telekom”, “HansaMatrix”, “Amber Grid”, “Energijos Skirstymo Operatorius”, “INVL Baltic Farmland”, “INVL Baltic Real Estate”, “INVL Technology”, “K2 LT”) did not have enough data as they were newly established. One company was removed from the research due to zero number of employees (“Trigon Property Development”). Overall, 58 companies were included in the research: 24 Latvian, 13 Estonian and 21 Lithuanian listed companies. All companies belong to the small capitalization group.

Aggregated intellectual capital index was calculated using regression analysis method and when factor values are calculated, the data is automatically standardized. Standardization is needed to ensure that variables with a large standard deviation are no longer dominant and do not distort the results, also, data standardization allows comparison between different measurement scales. Simple additive weighing (SAW) method was used to calculate the aggregate value of the company's intellectual capital factors. In this research an oblique factor rotation method Promax was chosen. In order to set weights for intellectual capital structural parts an expert evaluation was conducted. Results (Mačerinskienė & Survilaitė, 2019) revealed that the highest weight was given to human capital and the lowest to juridical capital (Kendall's W value was 0,797 meaning that the model is

reliable and can explain 80 per cent of variable variation). Relational capital was on the second and structural capital on the third place according to the importance.

Exploratory factor analysis was conducted taking into consideration *Anti-image* matrixes, MSA (Measure of Sampling Adequacy) values, KMO (Kaiser-Meyer-Olkin) test for sampling adequacy, and Bartlett's test. According to Kavaliauskienė (2010), it is not acceptable if KMO is less than 0,5. Correlation analysis of the intellectual capital structural parts indicators' revealed that there is no strong relationship between the pairs of indicators, that means that exploratory factor analysis can be conducted further. Nevertheless, from the human capital indicators *productivity of employees* (MSA – 0,438) was removed from further investigation. From the juridical capital indicators *location in the capital* (MSA – 0,434) was removed from further investigation. All indicators from structural and relational capital met necessary requirements.

To conclude, methodological approach depends on various criteria and research type and size. The methodology suggested in this article can be used in various sectors for various sizes and types of companies due to its simple and multi-criteria means.

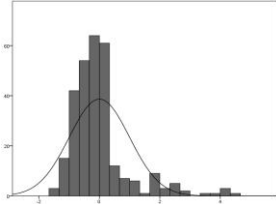
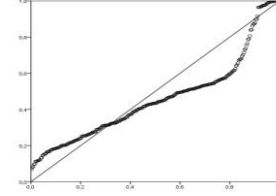
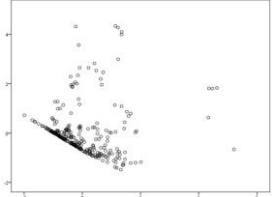
### **Results of the intellectual capital evaluation and its influence on market value**

The main goal of this article is to reveal if there is a statistically significant relationship between intellectual capital of the company and its market value. Hypotheses are formulated and the hypothesis is confirmed if the resulting regression models are statistically significant and consistent with the criteria. If the resulting regression models are not statistically significant, the null hypothesis is accepted, which means that there is no statistically significant relationship between intellectual capital of the company and its market value. Results revealed (Table 1) that there is a statistically significant relationship between intellectual capital of the company and its market value.

Table 1. The results of the multi-regression model of intellectual capital influence on the market value of listed companies of the Baltic States

<b>Criteria</b>	<b>Listed companies of the Baltic States</b>
Pair correlation coefficients	0,340
Level of significance of correlation	0,000



Determination coefficient ( $R^2$ )	0,583
ANOVA p	0,000
Cook's distance	0,019
Histogram of standardized residues	
P-P graph	
Diagram of Standardized Residue and Regression Estimated Values	
Shapiro–Wilk test	0,000
Kolmogorov–Smirnov test	0,000
Durbin–Watson statistic	0,452

According to the results, it is identified that there is a statistically significant relationship between intellectual capital of the company and its market value. Therefore a linear regression model can be built. Results revealed that ANOVA p value is less than respective significance level and determination coefficient (0,583) is suitable for the further review. What is more, Cook's distance does not exceed one, so it can be concluded that there is no stand outs in the standardized residual errors. The histogram of the standardized residuals and the P-P graph show the normality of the standardized residual errors. There is no pattern in the scatter plot of the diagram of standardized residue and regression estimated values, suggesting that the data is not heteroskedastic. In addition to this, the review of the distribution of errors revealed that the values of the Shapiro–Wilk test and Kolmogorov–Smirnov test criteria have not been distributed according to the normal distribution. As per Čekanavičius and Murauskas (2014), it is recommended to interpret the results of these tests with caution because in the case of a large number of observations, the assumption of normality can be rejected even when the distribution of observations is not significantly different from the normal distribution. Additionally, it can be assumed that the observations are autocorrelated if the Durbin and Watson statistic is close to 0 or 4. Thus, the regression model can be described using the regression equation as follows (Formula 1).

$$\text{BSLCMV} = 72275 + 125345\text{IC}, \quad (1)$$

where:

BSLCMV – Baltic States’ listed companies’ market value;

IC – Baltic States’ listed companies’ intellectual capital.

The positive coefficient of the independent variable of the equation indicates that the aggregated intellectual capital index of the Baltic States’ listed companies has a positive influence on their market value. The tendency of this linear regression is provided in the graph below (Figure 2).

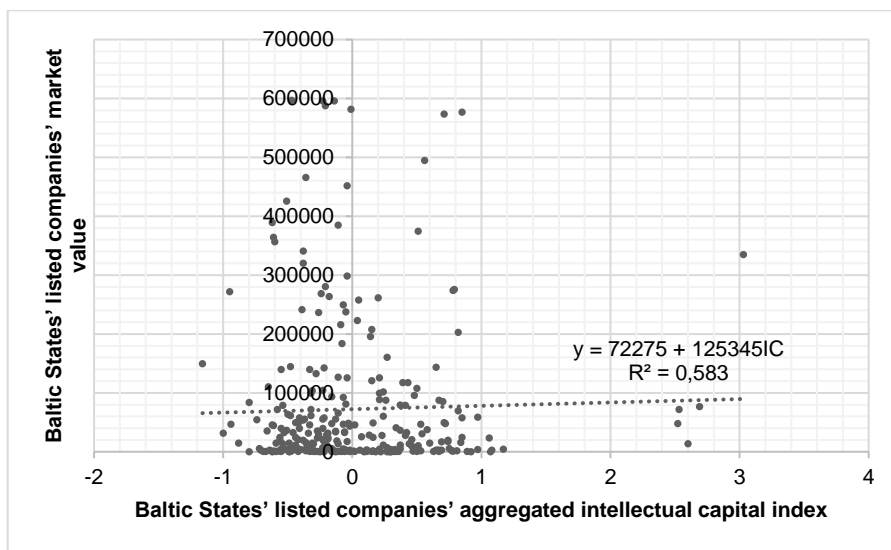


Figure 2. Dependency between Baltic States’ listed companies’ intellectual capital and their market value

The graph reveals that those Baltic States’ listed companies that have a larger aggregated intellectual capital index have a larger market value. Determination coefficient is 0,583 meaning that the model explains 58 per cent of the Baltic States’ listed companies’ market value variation. In addition to this, a further research was conducted in order to find out which structural parts of intellectual capital have a statistically significant relationship with the market value of Baltic States’ listed companies. Results revealed (Mačerinskienė & Survilaitė, 2019) that human capital and relational capital have the largest influence for the market value of listed companies. However, in

companies where structural capital represents a major intellectual capital aggregated index part, a lower level of intellectual capital was observed.

To sum up, it was noticed that there is a statistically significant relationship between intellectual capital of the company and its market value and it can be useful to build a linear regression model. When intellectual capital of the company increases, its market value increases too. In order to identify how different elements of intellectual capital affect the market value of respective companies, further research is needed.

### **Conclusions and recommendations**

The concept of intellectual capital is dynamic and multi-criteria, which creates a need to conduct multiple different studies in order to identify and describe company's intellectual capital appropriately. The research conducted by various scientists revealed that there are various approaches used to describe and assess company's intellectual capital. In this scientific paper it was chosen to investigate company's intellectual capital and what impact it has on its market value. Due to the complex nature of intellectual capital there is no commonly used harmonised intellectual capital description. In this scientific paper it was proposed to use intellectual capital description as follows: the aggregate of intangible resources a company has at its disposal that enables a company to operate at its best, creates a competitive advantage and increases market value. In order to investigate how company's intellectual capital impacts its market value exploratory factor analysis was conducted. Results revealed that there is a statistically significant relationship between intellectual capital of the company and its market value. In addition to this, it was identified that human capital and relational capital have the largest influence for the market value of listed companies. In companies where structural capital represents a major intellectual capital aggregated index part, a lower level of intellectual capital was observed. These findings were not expected, so it would be advised to investigate such phenomenon further. The results are consistent with Chen et al. (2005, pp. 159-176), Wang (2008, pp. 546-563) and Shakina and Barajas (2014, pp. 861-881) studies, which revealed that the company's intellectual capital has an impact on its market value, and human capital has the greatest impact on the company's market value. Nevertheless, in the intellectual capital model some elements that are important were not included due to their intangible nature: employee motivation, employee satisfaction, trust, and others. It would be useful to

investigate the concept of intellectual capital further and include more elements that could provide a better representation of it and how it affects market value of respective companies.

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