EVALUATION OF THE INTELLECTUAL CAPITAL IMPACT ON THE COMPANY'S ATTRACTIVENESS

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Abstract

At present, the most effective tool that allows strategic and operational restructuring of the business system is the business value management process, which helps to increase capitalization and attractiveness of investments, ensure efficient use and formation of all kinds of resources. Therefore, in the knowledge economy, which is characterized by innovation and greater influence of intellectual processes on economic activity at all levels of the economy, this process is impossible without determining the role of intellectual capital as an intangible component of the company's value and its effective management. The article examines the structure of intellectual capital, which consists of three components: human capital, relational capital and structural capital. The aim of the article is to make a ranking of companies attractiveness by application of criteria decision-making method TOPSIS considering the structure of intellectual capital. To achieve the goal, an analysis of scientific literature, secondary data analysis, comparative analysis and the criteria decision-making method TOPSIS are emphasized.

Keywords: structure of intellectual capital, technique for order of preference by similarity to ideal solution, human resources capital, structural capital, relational capital.

INTRODUCTION

The influence of intellectual capital on the performance of companies and their business value is a relevant topic until now. Although this topic has been more actively analyzed since 1990, technological changes, constantly changing operating conditions and challenges force scientists and practitioners, company managers to look for new opportunities to increase the influence of intellectual capital in order to achieve the company's competitiveness in conditions of risk and uncertainty. The survival of many companies depends on their willingness and ability to adapt to such changes. Most scientists have proven through their research that intellectual capital is the main driver of successful and efficient economic activity [2][3][5]. According to Abdulaali [1], intellectual capital is a driver of intangible value in an organization that brings benefits in the future. To prove this, the aim is to investigate what influence intellectual capital has on the profitability of companies, the development of innovations, added value, and increasing value. As noted by Simanavičienė & Gižienė [15], in economic activity, as a result of globalization processes, more and more importance is given not to material resources (financial, etc.), but to human capital, which is formed from knowledge, abilities and skills. Using intellectual capital, companies can quickly adapt to changes and remain competitive in the markets. Intellectual capital is increasingly becoming a source of competitive advantage due to the comprehensive implementation of innovation [2][11]. As a result, the use of new and innovative technologies has created a growing need for competent and educated, qualified workers. Countries with few natural resources should focus on the development and implementation of the latest technologies in order to achieve a competitive advantage for companies in World markets. At the same time, they must pay more attention to human capital as a component of intellectual capital.

As it was already mentioned, in the current scientific literature, much attention is paid to the intellectual capital of the organization, which involves all intangible resources in order to increase the value of the company and its competitiveness. Most of the conducted

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scientific studies have proven that all components of intellectual capital affect the company's added value and business value, but it should be noted that only a very small part of the indicators characterizing intellectual capital are presented in financial reports. For this reason, information is only partially provided to interested parties. Therefore, researchers often use multi-criteria decision-making methods, expert evaluation and other methods in research to prove the impact of all components of intellectual capital on the value of the company, as well on the company's attractiveness.

The aim of the article is to make a ranking of companies attractiveness by application of criteria decision-making method TOPSIS considering the structure of intellectual capital. To achieve this goal the structure of intellectual capital has to be described. In this paper the structure of intellectual capital consists of three components: human capital, relational capital and structural capital. To achieve the goal, an analysis of scientific literature, secondary data analysis, comparative analysis and the criteria decision-making method TOPSIS are emphasized.

CONCEPT AND THE STRUCTURE OF THE INTELLECTUAL CAPITAL

Various definitions have been given by researchers to the concept of intellectual capital. Most of them give very similar definition of the concept of intellectual capital and try to answer to the similar questions. Stewart [16], Cricelli at al. [3][4], Survilaite [17] and others were analysing what resources actually make up these generic capital forms is unique to each and every organisation, as only those resources that are important for creating value should be included in constructing the distinction tree for an organization. Intellectual capital approach helps us to develop a strategy that focuses on intangible resources, allowing them to be managed more effectively and increasing in shareholder value. Mostly scientists understand intellectual capital as the sum of all knowledge in the company that is able to generate company's value added and is affected by knowledge quality and knowledge productivity [3][5][11]. In fact intellectual capital is the concept without any clear guidance as to what exactly it is and what structure it has. Nevertheless, it is agreed that intellectual capital is an intangible concept, which is difficult to define and evaluate [19][20]. It is also agreed that intellectual capital is observed as a value driver of company's successful activity and performance. Joint-stock companies have a huge quantity of intellectual capital and the potential not just to maintain it, but also to strengthen and develop it more applying innovations, educating and motivating of employees etc. Thus intellectual capital can be understood as the economic value of intangible assets of a company. In this case company is perceived in general.

After analyzing the scientific literature, it is possible to distinguish six main features that describe and reveal the complexity of the concept of intellectual capital. Based on research conducted by researchers, it can be said that intellectual capital is unique and thus contributes to the creation of an organization's competitive advantage [8][12]. Thus intellectual capital, by creating a competitive advantage, affects the successful operation of the company. Most researchers emphasize the influence of intellectual capital, which consists of intangible resources in the company, on increasing the company's business value [12][13]. Many authors emphasize that the concept of intellectual capital is holistic and dynamic [9][10]. Some of them emphasized that intellectual capital is irreplaceable [4][19]. Thus the main features of intellectual capital are such: it is unique, creating of competitive advantage of the company, intangible and invisible, dynamic, creating of the companies' added value and market value; irreplaceable.

The ability to foster and increase the value added in companies is one of the most important intellectual capital functions. Summarizing the examined scientific literature we could emphasize that intellectual capital is the total amount of intangible capital of a company, which significantly increases the value added of the respective company.

The structure of intellectual capital is discussed in many scientific papers by various authors and can be understood as the sum of:

- Human capital, structural capital and customercapital [9][16];
- Human capital, structural capital and

relational capital [5][17];

- Human capital, structural capital, market capital and innovational capital [1][10];
- Human capital, customer capital, process capital and innovation capital [4][11].

The intellectual capital literature draws on aspects of practical applications, providing a framework for explaining the value creation process as the link between resources and shareholder value [19]. By these authors intellectual capital is present in three dimensions of business or in one of these three dimensions: its staff (Human Resource Capital), its structures (Structure Capital) and its customers (Relational Capital).

- By Macerinskiene & Survilaite [18], Edvinsson & Malone [5], Seo & Kim [14] Human Recourse capital indicators are selected for further research: number of employees, education of employees; productivity of employees, and personnel costs that consists of two main indicators: expenses per employee and proportional costs of employee.
- As Structural capital indicators are selected for further research: financial leverage, company's identity that consists of two main indicators: company's age and strategy implementation.
- As Juridical capital indicators are selected for further research: intangible assets, legally protected information that was treated as the number of patents, licences, trademarks, also characteristics of the company that consists of two main indicators: location in the capital and number of subsidiaries.
- As Relational capital indicators are selected for further research: relational expenses that are treated as marketing, advertising, representation expenses and dissemination of company's awareness that consists of three main indicators: social networks, evaluation of the social networks, respectability of the company e.t.c. [5][14][18]

Thus in this paper intellectual capital is considered to be the sum of human capital, structural capital (including organizational capital and juridical capital) and relational capital (social capital).

METHODOLOGICAL PART OF THE STUDY

Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) method for decision support system is quite widely applied in decision making process solving of problems in economics and management. TOPSIS is the part of the analytical multi-criteria decision-making technique first introduced by Yoon and Hwang. The main idea of this technique, the preferred alternative is the one with the most close to the positive ideal solution and the further to the negative ideal solution [6][7].

TOPSIS indicates the best and the worst solutions with regard to each criteria [6][7]. The TOPSIS method is based on vector normalization:

$$\widetilde{r}_{ij} = \frac{r_{ij}}{\sqrt{\sum\limits_{j=1}^{n} r_{ij}^2}}, \qquad (1)$$

where $\widetilde{r}_{ij}$ is a normalized value of ith criterion for j^{th} object.

The best (V^*) and the worst (V^-) solutions are calculated by formula:

$$V^* = \{V_1^*, V_2^*, ..., V_n^*\} = \{(\max_j \omega_i r_{ij} / i \in I_1), (\min_j \omega_i \widetilde{r}_{ij} / i \in I_2)\}$$

$$V^- = \{V_1^-, V_2^-, ..., V_n^-\} = \{(\min_j \omega_i r_{ij} / i \in I_1), (\max_j \omega_i \widetilde{r}_{ij} / i \in I_2)\}$$

$$(2)(3)$$

where: I_1 is a set of maximizing criteria, I_2 is a set of minimizing criteria, r_{ij} is a normalized value of ith criterion for j^{th} object, ω_i – weight of ith criterion ($\sum\limits_{i=1}^{n} \omega_i = 1$).

The distance of each alternative to the best and the worst solutions is calculated:

$$D_j^* = \sqrt{\sum\limits_{i=1}^{n} (\omega_i \widetilde{r}_{ij} - V_i^*)^2}, \qquad (4)$$

$$D_j^- = \sqrt{\sum\limits_{i=1}^{n} (\omega_i \widetilde{r}_{ij} - V_i^-)^2}. \qquad (5)$$

where D_j^* – distance to the best solutions, D_j^- – distance to the worst solutions.

The main criterion C_j^* is calculated by formula:

$$C_j^* = \frac{D^-}{D_j^* + D_j^-}, \qquad (6)$$

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where ($j = 1,…, n$), and C_j^* must be between $(0 \leq C_j^* \leq 1)$.

Followed by the TOPSIS method criterion C_j^* with maximum value corresponds to the best alternative. Finally all alternatives should be ranked in descending order [6][7].

RANKING COMPANIES BY IMPACT OF INTELLECTUAL CAPITAL

Criteria and alternatives must be selected in order to evaluate the influence of intellectual capital of companies on their attractiveness. Small capitalization companies operating in Lithuania were chosen as alternatives for tendering. These are companies with a market value of less than 150 million euro. Indicators of components of intellectual capital were selected as criteria. The data for the study was taken from financial statements of companies of 2020 year. The weights assigned to each criterion are the same. It should be noted that for accurate research results, the AHP method should be applied for determination the weights of each criterion [6]. All results are presented in the Table 1. After this step should be prepared a normalised matrix of presented alternatyves – companies and it's criteria (2 table).

1 table. Lithuanian Joint Stock Companies for ranking and it's criteria

Companies	Amount of employees	Education of employees	Part of personnel costs, %	Costs per one employee thousand Eur	Finan-cial leverag e	Age of the company	Intangibl e assets, thousand Eur	Marke-ting expenses, thousand Eur
	max	max	max	max	min	max	max	max
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125
Apranga	1956	0,218	0,358	2,325	1,48	28	534	2021
AUGA group	1158	0,233	0,458	4,047	1,31	18	2723	846
Šiaulių bank	849	0,870	0,362	27,644	7,4	29	4232	2716
Klaipėdos nafta	411	0,599	0,478	11,406	0,29	27	496	54
Panevėžio statybos trestas	284	0,326	0,293	16,141	1,67	28	290	45
Pieno žvaigždės	1696	0,246	0,432	3,515	1,18	22	86	1286
Rokiškio sūris	1386	0,108	0,343	2,234	0,36	29	82	169
Žemaitijos pienas	1242	0,159	0,455	10,960	0,34	28	53	96
Utenos trikotažas	1081	0,103	0,333	1,749	1,23	26	9448	445

Source: https://nasdaqbaltic.com/statistics/lt/shares

2 table. Normalised Matrix

Companies	Amount of employees	Educatio n of employees	Part of personnel costs, %	Costs per one employee, thousand euro	Financi al leverag e	Age of the company	Intangi ble assets, thousan d euro	Marketing expenses, thousand euro
	max	max	max	max	min	max	max	max
Weights	0,125	0,125	0,125	0,125	0,125	0,125	0,125	0,125
Apranga	0,525	0,180	0,288	0,064	0,169	0,334	0,049	0,539
AUGA group	0,311	0,192	0,368	0,111	0,150	0,215	0,251	0,225
Šiaulių bank	0,228	0,717	0,291	0,757	0,845	0,346	0,390	0,724
Klaipėdos nafta	0,110	0,493	0,384	0,312	0,033	0,322	0,046	0,014
Panevėžio statybos trestas	0,076	0,269	0,235	0,442	0,191	0,334	0,027	0,012
Pieno žvaigždės	0,455	0,203	0,348	0,096	0,135	0,262	0,008	0,343
Rokiškio sūris	0,372	0,089	0,275	0,061	0,041	0,346	0,008	0,045
Žemaitijos pienas	0,333	0,131	0,366	0,300	0,039	0,334	0,005	0,026
Utenos trikotažas	0,290	0,085	0,268	0,048	0,140	0,310	0,871	0,119

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After this step a weighted matrix has to be prepared. In the 3rd table are shown ideal positive and negative solutions.

3 table. Positive and negative solutions

V$^+$	0,066	0,090	0,048	0,095	0,004	0,043	0,109	0,090
V$^-$	0,010	0,011	0,029	0,006	0,106	0,027	0,001	0,001

After identification of ideal positive and negative solutions the distance to the ideal positive and negative solutions has to be calculated. Finally a ranking of all alternatives should be done (4 table).

4 table. Distance to the ideal positive and negative solutions and ranking

Companies	S_i^+	S_{i-}	P_i	Rank
Apranga	0,153	0,123	0,444	2
AUGA group	0,148	0,103	0,410	6
Šiaulių bankas	0,124	0,158	0,560	1
Klaipėdos nafta	0,158	0,121	0,433	4
Panevėžio statybos trestas	0,166	0,099	0,374	8
Pieno žvaigždės	0,159	0,111	0,411	5
Rokiškio sūris	0,182	0,109	0,373	9
Žemaitijos pienas	0,169	0,113	0,400	7
Utenos trikotažas	0,151	0,122	0,441	3

5 table. Annual Returns % (EUR) for 5 years period

	2017	2018	2019	2020	2021	2022
Rokiskio Suris AB	60.11	-5.09	4.38	19.84	2.05	7.12
ŠIAULIŲ BANKAS AB	58.75	-17.28	33.42	-1.58	53.75	-26.16
Apranga APB	4.67	-30.24	40.44	-14.69	12.78	9.11
NASDAQ OMX Vilnius GR EUR	16.97	-5.57	15.44	14.67	18.31	-7.38

Source: https://nasdaqbaltic.com/statistics/lt/shares

The best results show the Šiaulių bankas AB. The uniqueness of this bank is that a very large number of employees have a higher education comparing to other companies. Costs per one employee are also biggest comparing to other companies. The biggest amount of marketing expenses also is seen in this bank. It means that top management of the bank is paying a big attention to the customer relationship management and of course to the intellectual capital of the company. In the second places are Apranga APB. This company is also characterized by big attention to the intellectual capital of the company. In the 5 table are presented annual returns of three companies, two of them are in the first and second place, Rokiskio suris AB – in the ninth place. For further researches should be analyzed correlation between annual returns of companies and impact of intellectual capital on these companies.

CONCLUSION

After analyzing the scientific literature six main features that describe and reveal the complexity of the concept of intellectual capital were distinguished. It is uniqueness, possibility to create of competitive advantage of the company, as well, to create companies added value and market value also intellectual capital is intangible and invisible, dynamic and irreplaceable.

The structure of intellectual capital in this research is considered to be the sum of human capital, structural capital (including organizational capital and juridical capital) and relational capital (including social capital).

TOPSIS method is appropriate tool for ranking companies by the influence of intellectual capital to the company attractiveness.

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