RESEARCH ON THE RELATIONSHIP BETWEEN INTELLECTUAL CAPITAL AND INDICATORS OF WORK RESULTS OF EMPLOYEES IN THE BANKING SECTOR OF THE REPUBLIC OF SERBIA

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Abstract: *Intellectual capital in the knowledge economy is recognized as a key driver of value creation in the banking sector, which affects the business results of banks and the success of realization of business activities. The efficiency of the use of intellectual capital depends on the employees, which points out the need to analyse the relationship between intellectual capital and the efficiency of employees. The aim of the research in this paper is to identify the relationship between intellectual capital and indicators of work results of employees in the banking sector of the Republic of Serbia. The sample consists of all banks which, according to the data of the National Bank of Serbia, operated in 2018. In order to test the research hypotheses, correlation and regression analysis is used. The results of the research clearly show that intellectual capital affects employee productivity. The coefficient of capital employed efficiency has the most significant impact on employee productivity.*

Key words: *intellectual capital, VAIC, human capital, structural capital, value-added per employee*

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ISTRAŽIVANJE POVEZANOSTI IZMEĐU INTELEKTUALNOG KAPITALA I POKAZATELJA REZULTATA RADA ZAPOSLENIH U BANKARSKOM SEKTORU REPUBLIKE SRBIJE

Sažetak: Intelektualni kapital u ekonomiji znanja prepoznaje se kao ključni pokretač stvaranja vrednosti u bankarskom sektoru koji utiče na poslovne rezultate banaka i uspešnost realizacije poslovnih aktivnosti. Efikasnost upotrebe intelektualnog kapitala zavisi od zaposlenih, što navodi na potrebu istraživanja odnosa intelektualnog kapitala i efikasnosti rada zaposlenih. Cilj istraživanja u radu jeste identifikacija veze između intelektualnog kapitala i pokazatelja rezultata rada zaposlenih u bankarskom sektoru Republike Srbije. Uzorak čine sve banke koje su, prema podacima Narodne banke Srbije, poslovale u 2018. godini. U cilju testiranja postavljenih istraživačkih hipoteza koriste se korelaciona i regresiona analiza. Rezultati istraživanja jasno ukazuju da intelektualni kapital utiče na produktivnost zaposlenih. Najjači uticaj na produktivnost zaposlenih ima koeficijent efikasnosti angažovanog kapitala.

Ključne reči: intelektualni kapital, koeficijent dodate vrednosti intelektualnog kapitala, ljudski kapital, strukturni kapital, dodata vrednost po zaposlenom

1. INTRODUCTION

The globalization process and the appearance of knowledge economy have speeded up the need for changes in the banking sector and redirected the operation of banking companies towards an increasing use of knowledge and intellectual resources, thus determining the role of material assets as secondary. Banking financial institutions are a part of the service sector whose operation is mostly based on the implementation of intellectual capital. An important component of intellectual capital is intellectual skills of employees, which, if efficiently managed, create value added of bank services (Singh, Sidhu, Joshi and Kansal, 2016). According to Alhassan and Asare (2016), the banking sector offers a broad range of possibilities of research on intellectual capital and productivity in the context of economic development. The analysis of development and efficiency of use of intellectual capital in banks is monitored by means of the value added intellectual coefficient (VAIC).

This coefficient is an analytical procedure designed to enable management, shareholders and other stakeholders to successfully monitor and evaluate the efficiency of value added by a company's total resources (Tran and Vo, 2018).

The aim of research in this paper is to identify the relationship between intellectual capital and indicators of work results of employees in the banking sector of the Republic of Serbia. In this paper, intellectual capital is observed by the VAIC. In addition to its introduction and conclusion, the paper contains three sections. The second section covers the literature review and, on the basis of the research conducted, points to the importance of application of the VAIC methodology in companies for the purpose of monitoring the value of intellectual capital; then, it describes the banking sector and its role in the knowledge economy also stating the results of the research on the analysis of intellectual capital in the banking sector. The third section describes the procedure for calculating the value added intellectual coefficient, defines the sample and research hypotheses. The fourth section presents the research results and discussion on the research hypotheses.

2. LITERATURE REVIEW

2.1. VALUE CREATION BY MEANS OF THE VALUE ADDED INTELLECTUAL COEFFICIENT

In the knowledge-based economy, generation and exploitation of knowledge represent a dominant part in the process of value creation (Goh, 2005). The domination of the knowledge-based economy has led a lot of companies to focusing on the use of intellectual capital as a strategically important resource of value creation (Haji and Mubaraq, 2012). Intellectual capital refers to the intangible assets or intangible business factors of a company which have a significant impact on its business success (Goh, 2005; Mondal and Ghosh, 2012; Haji and Mubaraq, 2012) and sustainable competitive development (Singh, et al., 2016; Alhassan and Asare, 2016). Goh (2005) argues that monitoring of the growth of intellectual capital of a company can be observed as an indicator of its future results. Hence, intellectual capital is comprised of all factors of production which are invisible in the traditional balance sheet and which participate in the value creation and become crucial for long-term profitability of a company (Mondal and Ghosh, 2012).

By intellectual capital, Murthy and Mouritsen (2011) mean human capital, which makes the source of creativity, organization capital, which

consists of best practices, and relational capital, which creates and develops knowledge through the relationships with customers and suppliers. The application of the VAIC model for monitoring the efficiency of use of intellectual capital in business operations has caused intellectual capital to be observed as a sum of human capital and structural capital. Human capital includes knowledge, capabilities and skills possessed by an employee as well as individual characteristics, such as loyalty, flexibility, diligence, persistence (Cabrita, Silva, Rodrigues and Dueñas, 2017). For El-Bannany (2012), human capital is a source of creating and maximizing business value. The value of contribution of each employee is reflected through the increase in their productivity (Cabrita et al., 2017). Structural capital covers infrastructure, information systems, databases, patents, administrative routines and processes which represent the intellectual potential of a company (Cabrita et al., 2017).

The value of intellectual capital is not easy to measure, despite numerous methods developed for its calculation (Singh et al., 2016). According to El-Bannany (2012), VAIC has produced very good results regarding measuring and analysis of intellectual capital performance. The use of VAIC is suitable for the companies which base their operation on intellectual abilities, since it allows measuring the efficiency of value creation (Kamath, 2007). Joshi, Cahill and Sidhu (2010) emphasize that the application of VAIC stresses the ability of an organization to successfully employ intellectual capital as a means of value creation. The main logic in the use of VAIC, as a tool for measuring intellectual performance, is seen by Kamath (2007) as follows:

- Intellectual potential is the most important resource of corporate success, especially in the knowledge economy;
- Raising the efficiency of intellectual potential is the simplest, cheapest and most secure way to ensure sustainable business success of companies;
- Numerous investigations have proved the suitability of VAIC as a tool for measuring intellectual capital;
- The fact that companies have higher expenditure on intellectual capital than on physical capital and that VAIC stands as a reliable indicator for the efficiency of use of intellectual capital are sufficient reasons for paying more attention to the intellectual potential of companies.

VAIC was built on the assumption that the value in a company is created by using two components: physical capital and intellectual capital (Kujansivu, 2005; Joshi et al., 2010). Intellectual capital, then, covers two components: human capital and structural capital (Pulic, 2004). VAIC is calculated as the sum of three coefficients: human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE). These coefficients measure the efficiency of use of intellectual capital (Alhassan and Asare, 2016). On the basis of the above, it can be concluded that VAIC represents a measure of the efficacy with which a company uses its intellectual capital, physical and financial capital to create value for its stakeholders (Alhassan and Asare, 2016).

Several key reasons which support the use of the VAIC method in the analysis of intellectual capital in companies can be summed up on the basis of the papers written by Firer and Williams (2003); Joshi et al., (2010) and Laing, Dunn and Hughes-Lucas (2010). Firstly, it provides standardized and basic measures, which allows more efficient implementation of comparative analysis, using a large sample size across various industrial sectors. Secondly, all data used for the calculation of VAIC were based on audited information (from financial reports) and therefore calculations can be regarded verifiable and objective. Thirdly, VAIC is a straightforward indicator which is easily calculated and understood by both internal and external stakeholders. Fourthly, the VAIC method is increasingly used by researchers, but it has also found its application in companies. Fifthly, it can be used in any organization, regardless of its size and the type of activity it deals with or it belongs to.

2.2. SPECIFICITY OF THE BANKING SECTOR

As financial intermediaries, banks play an important role in the redistribution of funds from surplus spending units to deficit spending units, thus providing the financial potential for undisturbed development of economic activities. Also, banks help in reducing the friction of costs of transactions and information asymmetry by monitoring the financial flows of borrowers and lenders (Alhassan and Asare, 2016). Banks represent an intellectually intensive economic sector, which emphasizes the need for developing intellectual capital as a significant resource in bank management (Alhassan and Asare, 2016). The importance of intellectual capital for the banking sector is under the influence of an increasing complexity and liberalization of the environment, where competitiveness depends on the quality of the human component of

intellectual capital, i.e. the ability to leverage employees' talent (Cabrita et al., 2017).

Banking industry is a knowledge-intensive branch of economy (Mondal and Ghosh, 2012), i.e. in the context of components of intellectual capital, an industry based on knowledge, skills, business systems and relationships (Cabrita et al., 2017). Unlike production companies, the banking sector offers knowledge-based products and services, integrating professional competencies and market needs to adequately manage risks and realize the desired profit (Cabrita et al., 2017). In the last years, the banking sector has been exposed to a high degree of competitiveness (Mondal and Ghosh, 2012) in the environment dominated by liberalization policy (Alhassan and Asare, 2016). Competition compels banks to adjust their competitive position by achieving sustainable financial performance (Mondal and Ghosh, 2012). The core competitiveness of the banking sector is the ability of management teams to systematically manage the knowledge and experience of their employees (Shih, Chang and Lin, 2010). This ability is the consequence of possessing and managing intellectual capital with the help of which employees effectively manage bank risks and create profits (Shih et al., 2010).

Banks base the realization of their business activities on the use of components of intellectual capital, too. Shih et al. (2010) argue that the knowledge in banks is created and used through the exchange and sharing of information, most frequently through the brainstorming technique. Cabrita et al. (2017) emphasize that banks intensively utilize human and relational capital for their survival and gaining competitiveness in the business world. The role of structural (organizational) capital in banks can be described as the power created from "something" inside banks and it includes organizational culture, business processes and systems, information systems, networking, computer software (El-Bannany, 2012). The realization of banking operations involves close interaction between employees and customers and, to a large extent, includes the application of components of structural capital (information and communication technologies) for the development of new products and services (Cabrita et al., 2017), as well as efficient delivery of the existing ones. Hence, banking activities are performed by the simultaneous use of human and structural capital, which is proved by the results of the study by Alhassan and Asare (2016), who conclude that changes in employee productivity

depend on the efficiency guided by modern technology in the banking sector.

2.3. INTELLECTUAL CAPITAL IN THE BANKING SECTOR

Empirical research emphasizes the importance of intellectual capital in the process of acquiring and maintaining competitive advantage in the banking sector (Alhassan and Asare, 2016) relying on the fact that knowledge is the main input in banking institutions (Cabrita et al., 2017). The banking sector is suitable for research on intellectual capital because the nature of the banking business is knowledge intensive, where highly qualified employees are dominant in the staff structure (Mavridis, 2004; El-Bannany, 2008; Joshi, et al., 2010; Singh et al., 2016). Kamath (2007); Mavridis (2004); Mavridis and Kyrmizoglou (2005) and Tran and Vo (2018) sum up the reasons for research on intellectual capital in the banking sector:

- There are reliable data from financial reports for the calculation of intellectual capital value and its components;
- The basic nature of the banking business is intellectually intensive;
- The structure of employees in the banking sector is intellectually more homogenous than in other economic sectors;
- Banking products are not tangible products, but services which are based on the use of intellectual capital, which requires investing in human resources, brand, systems and processes.

The empirical analyses conducted in the field of the banking sector prove the importance of intellectual capital for this knowledge intensive activity. The results of the study by Alhassan and Asare (2016) prove that VAIC has a positive impact on the productivity of the observed banks and that HCE and CEE are the main drivers of productivity growth in the banking industry of Ghana. El-Bannany, M. (2008) reaches a conclusion that bank efficiency, barriers to entry, investment in information systems of banks and the efficiency of investment in variables of intellectual capital have a significant impact on intellectual capital performance of banks. These variables can help the bank management to formulate and implement the strategies for development of intellectual capital and guide commercial banks to benchmark themselves in order to improve the process of value creation. Joshi et al. (2010) prove that VAIC has a significant relation with the costs of human resources and the value addition made by the Australian banks and that the observed banks, Australian owned, have a higher HCE compared to CEE and SCE. Goh

(2005) concludes that in the VAIC structure, the value of HCE is dominant over SCE and CEE. Also, this author concludes that there were significant differences in bank ranking from the aspect of efficiency and traditional accounting measures. The results of the study carried out by Mondal and Ghosh (2012) show that the relationships between intellectual capital performance of banks and the financial performance indicators are varied. Shih et al., (2010) conclude that human capital performance has a significant impact on structural capital and relational capital, whereas relational capital performance considerably influences the formation of structural capital in banks. Also, these authors conclude that the capability of creating knowledge is most important for intellectual capital in the banking sector. Tran and Vo (2018) prove that bank profitability is driven mainly by capital employed efficiency. HCE marginally reduces bank profitability in the current period, but it also has positive effects on future profitability.

The authors Bontis, Janosevic and Dzenopoljac (2013) apply VAIC in the analysis of the banking sector in Serbia and draw a conclusion that human capital influences employee productivity, structural capital influences the total assets and return on equity, while physical capital influences return on equity and banks profitability in Serbia. The author Radić (2016) in his paper analyzes the value of intellectual capital in the banking sector of Serbia by applying the method of calculated intangible value from 2012 to 2014. The results show that the quality of published information in the banking sector is at a higher level compared to other activities, both due to the dominant share of foreign capital in the ownership and due to the regulatory requirements which are, in the financial sector, for the purpose of preserving the stability of the financial system, comprehensive and more detailed than in the real sector. The same author concludes that Raiffeisen Bank and Banca Intesa have the largest "unrecognized" intellectual capital within the observed seven banks in the period from 2012 to 2014.

3. RESEARCH METHODOLOGY

3.1. CHARACTERISTICS OF THE SAMPLE AND DATA COLLECTION

According to the data of the National Bank of Serbia, 27 commercial banks operated in the Republic of Serbia (hereinafter referred to as: RS)

in 2018. The number of banks in the RS was monitored based on the data presented in The Annual Report on Activities and Results of Banks for 2014, 2015, 2016, 2017 and 2018, and certain oscillations in the number of banks within the observed time interval were noticed (Figure 1).

In the banking sector of RS, 27 banks operated at the end of 2018, out of which 20 banks were majority-owned by foreign shareholders, two banks were with predominantly private domestic capital and five banks were majority-owned by RS (The Annual Report on Activities and Results of Banks, 2018, p. 41). The trend of reducing the number of employees in the banking sector of RS started in 2009 and continued in 2018. The number of employees at the end of 2018 in the banking sector of RS was 22,830, which is by 225 less than in 2017 (The Annual Report on Activities and Results of Banks, 2018, p. 40). The sample in the paper comprises 27 mentioned banks, which made the basis for testing the research hypotheses. All the banks observed within the sample operate as joint-stock companies and, according to the data of the Business Registers Agency, are classified among large enterprises.
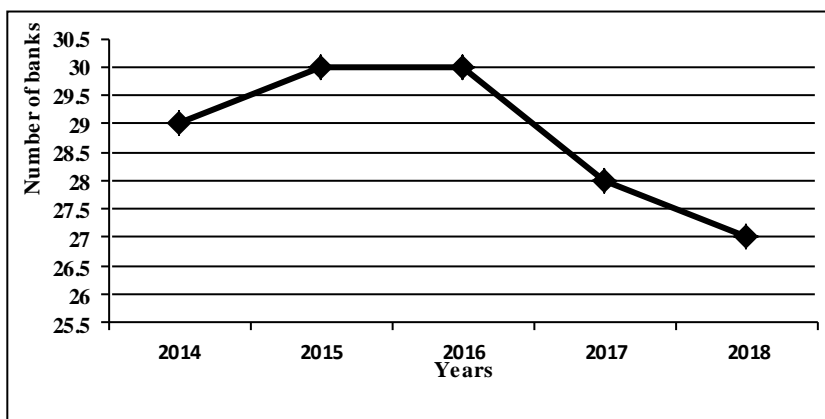

Figure 1. Trend in the number of banks in RS in the period from 2014 to 2018
Note. Created by the authors.

Monitoring of the value of intellectual capital in the banking sector of RS is performed by VAIC. The mentioned coefficient is used to measure the efficiency of use of intellectual capital and, within it, the efficiency of use of human and structural capital. This method was also applied by Joshi et al. (2010); Goh (2005); Bontis et al. (2013); Alhassan and Asare (2016); Tran and Vo (2018) in the analysis of intellectual capital in the banking sectors of different countries. Data collection for the needs of research was conducted on the basis of values of balance sheet positions presented

in the financial reports of banks (balance sheet and income statement), which were the basis for calculation of HCE, SCE, CEE and VAIC.

While calculating VAIC, Pulić (2004) starts from the value added as the most relevant indicator for business success, which is calculated as the difference between output (total sales) and input (costs of material, components and services). According to Joshi et al. (2010), the value added in banking operations is the difference between output (interest income, insurance income and other revenues) and input (interest expenses, insurance costs and other operating costs, excluding employee costs). In this paper, the value added is observed as the difference between outputs and inputs

$$VA = OUTPUTS – INPUTS \qquad (1)$$

where outputs represent the sum of interest incomes, fees and commission incomes and other operating incomes, while inputs represent the sum of interest expenses, fees and commission expenses and other expenses excluding the costs of salaries, fringe benefits and other personal expenses.

Intellectual capital is the sum of human and structural capital, so that the efficiency of intellectual capital will be monitored by means of these two components, following the calculation presented in the paper by Pulić (2004). HCE points to the efficiency of use of human resources in the banking sector. What is characteristic for this model and what should be emphasized is that the salaries of employees do not belong to inputs, which means that the costs for employees are not considered expenses, but investments (Pulić, 2004). HCE is calculated as follows:

$$HCE = VA/HC \qquad (2)$$

where VA – the value added and HC – human capital, the value of total salaries of employees in a company.

SCE implies the calculation of the value of structural capital, SC, after which SCE is calculated as the ratio of structural capital to the value added:

$$SC = VA – HC \qquad (3)$$

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

The higher the share of human capital in the value added, the smaller the share of structural capital and vice versa.

Intellectual capital efficiency, ICE, is the sum of human capital efficiency and structural capital efficiency.

$$ICE = HCE + SCE \qquad (5)$$

In order to calculate the efficiency of value creation, it is necessary to include physical capital in the calculation of VAIC. The efficiency of use of physical capital is measured on the basis of CEE, which represents the ratio of the value added, VA, to the book value of the net assets of the company, i.e. capital employed, CE, which is presented by the following equation:

$$CEE = VA/CE \qquad (6)$$

Finally, VAIC is the sum of indicators of efficiency:

$$VAIC = ICE + CEE \qquad (7)$$

VAIC shows the overall efficiency of a company and its intellectual capacity. A high coefficient indicates that more value is created using the company resources, including its intellectual capital (Pulić, 2004). On the basis of the methodology presented, VAIC was calculated for 27 banks which operated in RS in 2018 and the share of HCE, SCE and CEE components in VAIC was analyzed.

3.2. RESEARCH HYPOTHESES

The value of intellectual capital is made, besides other components, by the knowledge and experience of employees. The aim of the research refers to the identification of the relationship between intellectual capital and indicators of work results of employees. The method of correlation and regression analysis is used for monitoring VAIC components and employee productivity as well as the value added per employee, as the indicators of work results of employees (Figure 2).
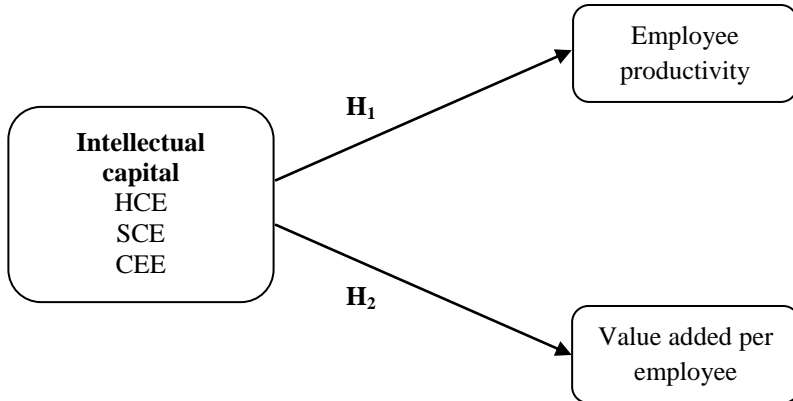
Figure 2. Research model.
Note. Created by the authors.

In accordance with the defined aim of the research, the following main and deduced research hypotheses were set:

H_1: Banks with a higher value of intellectual capital achieve higher employee productivity

>*H_{1a}: Banks with a higher HCE achieve higher employee productivity*
>
>*H_{1b}: Banks with a higher SCE achieve higher employee productivity*
>
>*H_{1c}: Banks with a higher CEE achieve higher employee productivity*

H_2: Banks with a higher value of intellectual capital achieve higher value added per employee

>*H_{2a}: Banks with a higher HCE achieve higher value added per employee*
>
>*H_{2b}: Banks with a higher SCE achieve higher value added per employee*
>
>*H_{2c}: Banks with a higher CEE achieve higher value added per employee*

Employee productivity is the relationship between pretax income and the number of employees. It is one of the most frequently used indicators of efficiency of employees' work. The detail about how much employees contribute to the creation of value added belongs to recent indicators of business operations and it measures the influence of knowledge, experience and capabilities of employees in the process of value creation. Value added per employee is the ratio of value added to the number of employees. Pulić (2004) argues that value added is the best indicator of business success, which is calculated as the difference between outputs and inputs. Employees are observed as drivers of value creation and sources of creating a competitive advantage, which leads to the need for examining the relationship between intellectual capital and the results of employees' work.

The data necessary for calculation of the values of dependent and independent variables were collected from secondary sources, financial reports of banks, published on the website of the National Bank of Serbia and the data available on the website of the Business Registers Agency.

4. RESEARCH RESULTS AND DISCUSSION

The research hypotheses were tested by the appropriate statistical methods and with the support of Statistical Package for Social Sciences IBM SPSS Statistics, Version 23. The confidence level $\acute{\alpha}=0.05$ was used for determination of statistical significance. The paper will firstly stress the role of intellectual capital (measured by VAIC) in the observed banks by ranking banks according to traditional and modern measures of business operations. Then, the share of human and structural capital in the total value of intellectual capital is analyzed. The next step refers to the application of appropriate statistical methods (correlation and regression analysis) in order to analyze the impact of intellectual capital on the indicators of employees' work, with the description of the sample observed.

The authors Goh (2005) and Joshi et al. (2010) compare bank ranking based on VAIC with bank ranking based on the values of traditional measures of performance (value of assets, net profit and equity). By comparing VAIC values with the traditional measures of performance, it is possible to classify banks into those with good financial performance, measured by traditional accounting measures, and those that achieve good financial performance by using intellectual capital (Goh, 2005).

Table 1

Bank ranking according to VAIC, net profit, value of equity and value of assets for 2018

Ord. no.	Name of bank	Net profit	Equity	Total assets
1	Agroindustrijsko komercijalna banka AIK banka a.d. Beograd	3	3	3
2	Unicredit Bank Srbija a.d. Beograd	2	2	2
3	Banca Intesa a.d. Beograd	6	7	7
4	Eurobank a.d. Beograd	7	5	6
5	Raiffeisen banka a.d. Beograd	5	1	5
6	Société Générale banka Srbija a.d. Beograd	15	4	26
7	Komercijalna banka a.d. Beograd	1	6	1
8	Erste Bank a.d. Novi Sad	8	16	8
9	Sberbank Srbija a.d. Beograd	4	9	4
10	ProCredit Bank a.d. Beograd	26	8	17
11	Opportunity banka a.d. Novi Sad	9	12	9
12	Addiko Bank a.d. Beograd	12	26	10
13	Halkbank a.d. Beograd	10	17	12
14	NLB banka a.d. Beograd	20	10	20
15	Direktna banka a.d. Kragujevac	14	20	16
16	OTP banka Srbija a.d. Novi Sad	17	13	15
17	Vojvođanska banka a.d. Novi Sad	21	15	14
18	Srpska banka a.d. Beograd	11	14	13
19	MTS banka a.d. Beograd	13	21	23
20	Crédit Agricole banka Srbija a.d. Novi Sad	16	22	11
21	JUBMES banka a.d. Beograd	22	18	24
22	Expobank a.d. Beograd	23	11	21
23	Bank of China Srbija a.d. Beograd	25	19	22
24	Telenor banka a.d. Beograd	18	27	18
25	API Bank a. d. Beograd	19	23	19
26	Banka Poštanska štedionica a.d. Beograd	27	25	25
27	MIRABANK a.d. Beograd	24	24	27

Note. Author's calculation based on the calculated indicators of values of positions presented in the financial reports of the banks downloaded from the website of the National Bank of Serbia.

Table 1, column two, presents the bank ranking according to VAIC. The third, fourth and fifth columns present the bank ranking according to the value of total assets, net profit and equity. Observing the values given in Table 1, it can be concluded that the banks which achieve high business results, measured by traditional indicators of performance, are not among the best ranked ones when their success is measured on the basis of the values of the intellectual capital they possess.

As VAIC represents the sum of HCE, SCE and CEE, it would be desirable to analyze the share of each of these components in the total VAIC value. Observing the calculated values, it can be concluded that the share of HCE dominates in VAIC, while the share of SCE and CEE is far less. In addition, the share of SCE in VAIC dominates if compared with CEE, except in the case of Telenor banka.

The sample characteristics are interpreted by analyzing the values of arithmetic mean, standard deviation, skewness and kurtosis. By observing the VAIC dimensions, the highest value of arithmetic mean was recorded in the case of HCE (Mean = 3,2104), whereas CEE has the lowest value of arithmetic mean (Mean = 0,2680). The highest standard deviation from arithmetic mean was recorded in HCE (Std. Dev.= 1,3164). The arithmetic mean for the observed dependent variables value added per employee is 7718,46, whereas in employee productivity it is 2547,35. The obtained values for skewness are both positive and negative, so that the obtained results are equally located between higher and lower values. Most results for kurtosis are positive, which indicates that the distribution is more peaked than a normal one.

Distribution normality in the sample was checked by the normality test. The sample size is smaller than 50 elementary units, so that the Shapiro-Wilk test is used. Taking into account that the value of the mentioned test for all observed variables is $p < 0.05$, it is concluded that the empirical distribution cannot be approximated by a normal one.

The analysis of the strength and direction of the relationship between the observed variables is performed by correlation analysis. The values of the correlation coefficient up to 0,3 indicate a weak correlation; those from 0,3 to 0,5 indicate a medium correlation, while the values higher than 0,5 indicate the presence of a strong correlation between the variables (Pallant, 2011). The direction of correlation is measured on the basis of positive or negative values of the correlation coefficient, where positive values indicate that the increase in one variable results in the increase in the other one and vice versa. Negative values of the correlation

coefficient indicate that the increase in one variable affects the decrease in the other variable and vice versa.

By observing the components of intellectual capital, it can be concluded that the strongest and statistically most significant correlation is between HCE and SCE ($\rho = 0,997$, $p = 0,000$). VAIC is most frequently correlated with HCE ($\rho = 0,996$, $p = 0,000$). By observing the relationship between dependent and independent variables, the strongest correlation is present between VAIC and employee productivity ($\rho = 0649$, $p = 0,000$) and SCE and employee productivity ($\rho = 0,660$, $p = 0,000$). Also, the results of correlation analysis also indicate the presence of negative correlation between the observed components of intellectual capital (SCE and HCE; SCE and CEE), so that the increase in the value of one variable affects the decrease in the other one and vice versa.

Regression analysis is conducted for the purpose of testing the impact of independent variables on dependent ones. The analysis of the main and deduced research hypotheses is carried out by means of four models, where simple regression analysis is firstly used to examine the impact of VAIC on the observed dependent variables (Table 2 and Table 4). In the next iteration, multiple regression analysis is applied to test the deduced hypotheses (Table 3 and Table 5), where the impact of VAIC components on the observed dependent variables is examined.

On the basis of the results of simple regression analysis (Table 2), it can be concluded that hypothesis H_1 is adopted, i.e. banks with a higher value of intellectual capital achieve higher employee productivity since $p = 0,001$. Such a result is expected because VAIC is most frequently correlated with the dependent variable employee productivity.

Table 2

Model 1: VAIC and employee productivity

Variables		Standard multiple regression		
Dependent	*Independent*	*Beta*	*t value*	*Sig.*
Employee productivity	VAIC	0,617	3,845	0,001**

Note. Dependent variable: employee productivity;
Significance: ** $p \leq 0,01$; * $p \leq 0,05$;
Calculated by the authors.

The testing of deduced research hypotheses requires the application of the multiple regression model. In order to check hypotheses H_{1a}, H_{1b} and H_{1c}, the impact of each VAIC component on employee productivity is tested (Table 3).

Table 3

Model 2: VAIC components and employee productivity

Variables		Standard multiple regression		
Dependent	*Independent*	*Beta*	*t value*	*Sig.*
Employee productivity	HCE	-0,032	-0,093	0,927
	SCE	-0,151	-0,921	0,367
	CEE	0,703	2,029	0,053*

Note. Dependent variable: employee productivity;
    Significance: ** $p \leq 0,01$; * $p \leq 0,05$;
    Calculated by the authors.

In model 2, the coefficient of determination R^2 is 0,464, which means that 46% of variance of employee productivity in the banking sector is explained by the regression model, while the rest of variance is under the influence of other factors. The F statistic value is 6,350, while the value Adjusted R square is 0,391. Table 3 presents the values of β coefficient, t value and the value of statistical significance for the observed model. On the basis of these values, it can be concluded that only CEE (β = 0,703; t = 2,029; p = 0,053) has a statistically significant impact on employee productivity in the banking sector, which means that hypothesis H_{1c} is accepted, while hypotheses H_{1a} and H_{1b} are rejected.

The relationship between intellectual capital and value added per employee is analyzed on the basis of simple and multiple regression analyses. In the first iteration, the impact of VAIC on value added per employee is analyzed.

Table 4

Model 3: VAIC and value added per employee

Variables		Standard multiple regression		
Dependent	*Independent*	*Beta*	*t value*	*Sig.*
Value added per employee	VAIC	0,199	0,997	0,329

Note. Dependent variable: value added per employee;
    Significance: ** $p \leq 0,01$; * $p \leq 0,05$;
    Calculated by the authors.

The results presented in Table 4 clearly indicate that hypothesis H_2 is not accepted, i.e. banks with a higher value of intellectual capital do not achieve higher value added per employee.

Table 5

Model 4: VAIC components and value added per employee

Variables		Standard multiple regression		
Dependent	*Independent*	*Beta*	*t value*	*Sig.*
Value added per employee	HCE	0,300	0,648	0,524
	SCE	-0,043	-0,199	0,844
	CEE	-0,107	-0,231	0,819

Note. Dependent variable: value added per employee;
　　　Significance: ** $p \leq 0,01$; * $p \leq 0,05$;
　　　Calculated by the authors.

Deduced hypotheses H_{2a}, H_{2b} and H_{2c} are tested by means of multiple regression analysis (Table 5). The coefficient of determination R^2 is 0,222, which means that 22% of variance of value added per employee is explained by the regression model, while the rest is under the influence of other factors. The F statistic value is 0,381, while the value of Adjusted R square is -0,080. The results in Table 5 clearly indicate that there is no statistically significant impact of any VAIC component on value added per employee and, therefore, hypotheses H_{2a}, H_{2b} and H_{2c} are not accepted. Such a result is expected because the main hypothesis H_2 is not accepted.

5. CONCLUSION

The competitive and efficient banking sector is a precondition for the economic growth and development of every national economy. Intellectual capital is becoming a strategically important resource of banks, which they use as the foundation for their business success and competitiveness. Intellectual capital covers human capital and structural capital. In this paper, the efficiency of use of intellectual capital is observed by VAIC.

The paper analyzes the efficiency of use of intellectual capital in the banking sector of the Republic of Serbia, which is made of 27 commercial banks. The research results prove the impact of intellectual

capital on employee productivity in the banking sector of Serbia, where CEE has the strongest impact on employee productivity. Such results were also confirmed by Alhassan and Asare (2016). Also, in this paper the banks are ranked according to VAIC and net profit, equity and total assets, where it is concluded that there are significant differences between bank ranking from the aspect of VAIC and bank ranking from the aspect of traditional indicators of performance. Similar results were also reached by Goh (2005) and Joshi et al. (2010). The paper also presents the conclusion that HCE dominates in relation to SCE and CEE in the VAIC structure, which was also proved by Joshi et al. (2010) and Goh (2005).

5.1. RESEARCH LIMITATIONS

The first research limitation is connected with the weakness of the VAIC methodology applied, which refers to the fact that this methodology does not cover the value of relational capital. Namely, there are more and more researchers who observe intellectual capital as the sum of human, structural and relational capital, so, for the purpose of improving the validity of the method applied, it is also necessary to calculate the efficiency of use of relational capital. In addition, relational capital, which includes brand, name and relationships with business partners, plays an increasingly significant role in the banking sector. The second limitation refers to the fact that calculation and monitoring of the value of intellectual capital on the basis of data from financial reports speak about the efficiency of use of this capital in the previous period (2018), which restricts the prediction of possible trends in the values of this capital in the future period, which is of particular importance for decision-makers and shareholders. The third limitation refers to the method of calculating the categories of output and input, which is the basis for calculation of value added. Outputs represent the sum of interest incomes, fees and commission incomes and other operating incomes, while inputs represent the sum of interest expenses, fees and commission expenses and other expenses. This category does not include incomes/expenses related to change in fair values of financial instruments, incomes/expenses related to reclassification of financial instruments, incomes/expenses related to risk hedging, incomes /expenses related to exchange differences and incomes/expenses related to the effects of agreed currency clause which are not clearly presented in the financial statement. The fourth limitation refers to the fulfillment of assumptions for implementation of regression analysis. Namely, the sample size for the implementation of regression analysis should satisfy the following condition: $N > 50+8*m$, where N is the sample size, and m is the number of independent variables in the

research model (Pallant, 2011). Such a weakness is justified by the fact that all banks operating in RS in 2018, and there were 27 of them, were included in the sample.

5.2. PRACTICAL IMPLICATIONS AND DIRECTIONS OF FUTURE RESEARCH

The research results clearly indicate that the management of banks must additionally invest in intellectual capital and the increase in CEE in order to provide the growth of results of employees' work. Also, investing in intellectual capital provides banks with the possibility for growth and development as well as for strengthening competitiveness in the banking market. Bank ranking according to VAIC shows the position of banks in the Serbian banking market, on the basis of which the management of banks can make appropriate decisions and undertake activities to invest in intellectual capital or more efficiently use it and thus change the position of the bank in this market. Also, the confirmed relationship between intellectual capital and employee productivity indicates that knowledge and capabilities of employees are an important factor, which influences the process of maximizing values. Future research may be based on the involvement of more components in the analysis of intellectual capital. A comparative analysis of the use of intellectual capital in the banking sector of Serbia and the banking sectors of the surrounding countries could be made. Future research could also deal with the relationship between the credit risk of banks and intellectual capital, as well as with the impact of intellectual capital on the liquidity and solvency of banks.

REFERENCES

Alhassan, A. L., & Asare, N. (2016). Intellectual capital and bank productivity in emerging markets: evidence from Ghana. *Management Decision*, *54*(3), 589-609.

Bontis, N., Janosevic, S., & Dzenopoljac, V. (2013). Intellectual capital and corporate performance of Serbian banks. *Actual problems of economiics*, *4*(34), 287 – 299.

Cabrita, M. R. M. F., Silva, M. L. R., Rodrigues, A. M. G., & Dueñas, M. P. M. (2017). Competitiveness and disclosure of intellectual capital: an empirical research in Portuguese banks. *Journal of Intellectual Capital*, *18*(3), 486-505.

El-Bannany, M. (2008). A study of determinants of intellectual capital performance in banks: the UK case. *Journal of Intellectual Capital*, 9(3), 487-498.

El-Bannany, M. (2012). Global financial crisis and the intellectual capital performance of UAE banks. *Journal of Human Resource Costing & Accounting*, *16*(1), 20-36.

Godišnji izveštaj o poslovanju i rezultatima rada banaka. (2018). Narodna banka Srbije, Beograd.

Goh, P. C. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital*, *6*(3), 385-396.

Laing, G., Dunn, J., & Hughes-Lucas, S. (2010). Applying the VAIC™ model to Australian hotels. *Journal of Intellectual Capital*, *11*(3), 269 – 283.

Haji, A. A., & Mubaraq, S. (2012). The trends of intellectual capital disclosures: evidence from the Nigerian banking sector. *Journal of Human Resource Costing & Accounting*, *16*(3), 184-209.

Joshi, M., Cahill, D., & Sidhu, J. (2010). Intellectual capital performance in the banking sector: An assessment of Australian owned banks. *Journal of Human Resource Costing & Accounting*, *14*(2), 151-170.

Kamath, G. B. (2007). The intellectual capital performance of the Indian banking sector. *Journal of Intellectual Capital*, *8*(1), 96-123.

Kujansivu, P. (2005). Intellectual capital performance in Finnish companies. In *Performance Measurement and Management Control* (pp. 1-14). Nice.

Mavridis, D. (2004). The intellectual capital performance of the Japanese banking sector. *Journal of Intellectual Capital*, *5*(1), 92-115.

Mavridis, D., & Kyrmizoglou, P. (2005). Intellectual capital performance drivers in the Greek banking sector. *Management Research News*, *28*(5), 43-62.

Mondal, A., & Ghosh, S. K. (2012). Intellectual capital and financial performance of Indian banks. *Journal of Intellectual Capital*, *13*(4), 515-530.

Murthy, V., & Mouritsen, J. (2011). The performance of intellectual capital: Mobilising relationships between intellectual and financial

capital in a bank. *Accounting, Auditing & Accountability Journal*, *24*(5), 622-646.

Pallant, J. (2011). *SPSS priručnik za preživljavanje.* Beograd : Mikro knjiga.

Pulic, A. (2004). Intellectual capital – does it create or destroy value? *Measuring Business Excellence*, *8*(1), 62-68.

Radić, S. (2016). Vrednovanje intelektualnog kapitala primenom metode obračunate nematerijalne vrednosti. *Ekonomske ideje i praksa*, 22, 71-88.

Shih, K., Chang, C., & Lin, B. (2010). Assessing knowledge creation and intellectual capital in banking industry. *Journal of Intellectual Capital*, *11*(1), 74-89.

Singh, S., Sidhu, J., Joshi, M., & Kansal, M. (2016). Measuring intellectual capital performance of Indian banks: A public and private sector comparison. *Managerial Finance*, *42*(7), 635-655.

Firer, S., & Williams, M. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital*, *4*(3), 348-360.

Tran, D. B., & Vo, D. H. (2018). Should bankers be concerned with Intellectual capital? A study of the Thai banking sector. *Journal of Intellectual Capital*, *19*(5), 897-914.