

Vladimir Dženopoljac

University of Kragujevac
Faculty of Economics
Department of Management and Business
Economics
Kragujevac

INTELLECTUAL CAPITAL: IMPORTANCE, MEASUREMENT, AND IMPACT ON CORPORATE PERFORMANCE

Intelektualni kapital – značaj, merenje i uticaj na
performanse

Abstract

There is evidence that intellectual capital (IC) positively affects growth potential and generates added value to the enterprise performance. Different forms of IC, such as knowledge, employee skills, talent and enthusiasm, patents, know-how, software, databases, management process, corporate strategy and plans, close relationships with customers, brand, unique organizational design, and corporate culture, can be classified as human, structural, and relational capital of an enterprise. The research studies that address IC measurement and its impact on corporate performance are gaining increasing attention during last two decades. This is especially important since there are various controversies and misunderstandings over IC nature. The paper presents the empirical results attained through six important research studies that investigated the impact of IC on corporate performance of enterprises in Serbia. The key research question is as follows: Do IC and its key components affect corporate performance of enterprises in Serbia, and if so, to what degree? The results of these studies reveal that corporate performance of enterprises in Serbia are mainly determined by the amount of physical and financial capital, and far less by the efficient use of different elements of IC.

Key words: *intellectual capital, intangible assets, corporate performance*

Sažetak

Brojni su dokazi koji nedvosmisleno ukazuju na činjenicu da intelektualni kapital opredeljuje potencijal rasta preduzeća i generiše najveći deo uvećane vrednosti. Različiti oblici intelektualnog kapitala, kao što su znanje, veštine, talenat i entuzijizam zaposlenih, patenti, *know-how*, softveri, baze podataka, menadžment proces, korporativna strategija i planovi, bliski odnosi sa klijentima, brend, jedinstveni organizacioni dizajn i poslovna kultura, mogu se kategorizovati kao ljudski, strukturni i relacioni kapital. Istraživanja u oblasti merenja intelektualnog kapitala i utvrđivanje njegovog uticaja na poslovne performanse preduzeća sve više dobijaju na značaju u poslednje dve decenije. Ovo je posebno imajući u vidu da ova pitanja prate i brojne kontroverze i nerazumevanja prirode intelektualnog kapitala. U radu se daje pregled rezultata do kojih se došlo u šest različitih istraživačkih studija o uticaju intelektualnog kapitala na poslovne performanse preduzeća u Srbiji. Ključna istraživačka dilema u radu je: da li intelektualni kapital i njegove različite komponente utiču na poslovne performanse preduzeća u Srbiji i u kojoj meri? Rezultati šest najznačajnijih istraživanja u Srbiji ukazuju da su poslovne performanse preduzeća i dalje pod jačim uticajem fizičkih i finansijskih resursa, a manje pod uticajem efikasnosti upotrebe pojedinih elemenata intelektualnog kapitala.

Ključne reči: *intelektualni kapital, nematerijalna aktiva, poslovne performanse*

Introduction

The important characteristic of business model in the knowledge-based economy is domination of intangible resources over material ones in the value creation process of an enterprise. After introducing Windows 95, the market value of Microsoft rose to USD 100 billion, which was higher than Chrysler and Boeing at the time. For comparison, the book value of Microsoft was only USD 8 billion. Netscape was worth USD 17 million prior to becoming public company and was hiring only 50 employees. On the first day as a public company, the market value of Netscape went to USD 3 billion. In addition, the average market value of all the enterprises on New York Stock Exchange (NYSE) is 2.5 times their book value, while the IT companies have market value approximately 10 times their book value. The question here is obvious: How can we explain this evident disparity between market and book value of mentioned enterprises [3, pp. 1-2]? The answer to this question lies in the effective and efficient use of intangible resources enterprises possess such as knowledge, competencies, experience, brand, corporate image, leadership, corporate culture and alike.

Until the 1990s, a typical process of strategic management started from external environment analysis and then went to internal analysis. This approach proclaimed that a strategist should firstly analyze external opportunities and threats, and afterwards industry attractiveness from the standpoint of competition, entry barriers, substitutes, negotiation power of suppliers and customers. The next phase implies internal analysis through identification of strengths and weaknesses in order to formulate the strategy adequately. The final phase entails strategy implementation through resources allocation. However, contemporary strategic management approaches place focus on internal rather than external perspective. Within the phase of strategic analysis, the focus shifts from industry structure and competitive positioning to internal factors and business processes, which are unique to certain enterprise. This management approach is known as the resource-based view of the firm (RBV) [19, p. 396].

The resources of an enterprise represent the key factor in strategy formulation and implementation.

Competitiveness is achieved by ownership and productive use of enterprise resources. The resources represent the most significant prerequisite for attaining and sustaining competitive advantage. RBV assumes that enterprise possesses different sorts of resources that allow it to develop various strategies [27]. *Barney* [5] views enterprises as heterogeneous entities, which are characterized by their unique resource base. In this sense, certain resources are more potent in terms of achieving sustainable competitive advantage. The resources that have better potential for attaining competitive advantage are valuable, rare, difficult to imitate, and without substitute.

In the era of knowledge, resources that do not possess physical form are becoming more important and represent the critical factor of corporate success. *Prahalad* and *Hamel* [47] used the term “core competence” in order to describe enterprises’ ability to learn, coordinate different production capabilities, as well as their ability to adopt new technological trends. In comparison to tangible resources, the intangible ones, such as knowledge, skills, talent, relationship with clients, corporate culture, reputation, and organizational practices, are not explicit and visible [56]. These intangible resources and the ability to exploit them properly represent the essence of intellectual capital (IC).

The IC value of most successful enterprises is often 10 to 20 times their value of material assets [51, p. 2]. Ongoing economic crisis especially emphasizes the importance of investing in IC. Investing in immaterial assets is the best way of coping with the challenges of today’s economic ambient [38]. However, despite its significance, assessing the value of IC is very difficult task. This is why many researchers focused their efforts towards the issues of evaluating IC and determining its impact on corporate performance. This is especially important for Serbian economy since a low level of competitiveness of its real sector points to the importance of executing new proactive strategy. According to *Amit* and *Schoemaker* [2], managers are the ones who face the challenges of identifying, developing, protecting, and using the resources and competencies, in a way that would enable the enterprise to achieve sustainable competitive advantage and extraordinary returns.

The paper analyzes the actual situation in terms of researching the impact of IC on corporate performance of

enterprises in Serbia. The paper has *two basic objectives*. *Firstly*, to compare results of research studies undertaken in different countries, using different samples, to the results of the research studies done in Serbia. *Secondly*, based on these empirical results it is important to estimate the impact of IC on corporate performance of enterprises in Serbia. In accordance to these research results, the paper explores the following *research question*: Do IC and its components affect corporate performance of Serbian enterprises and to what extent? Bearing in mind the research objectives and the basic research dilemma, the paper will use conventional research methods that are based on the collection and analysis of available literature and empirical data, including the results of author's own long-term research carried out in Serbia.

In accordance with the foregoing, the work is divided into an introduction and the following four parts. The first part, which is devoted to the definition and importance of IC, is a theoretical and methodological framework for understanding the concept of IC and its importance for creating value in the enterprises of information era. The second part relates to the most important approaches to measuring IC and its contribution to the creation of value. The third and crucial part of the work deals with the analysis of the results of applied research studies in Serbia, which are intended to demonstrate the impact of IC on business performance of enterprises. The final part contains concluding remarks and directions for future research.

Definitions of intellectual capital

The conceptual basis for an adequate understanding of the IC relates to the RBV. The problem with the IC management is reflected in the fact that managers are aware that it is a critical factor for business success in the knowledge-based economy, and yet, on the other hand, are unable to provide an adequate definition of IC as well as to identify clearly its constituent elements. In the literature, there are many definitions of IC as well as a number of terms by which it is described. One of the most widely accepted ways of defining IC comes from researchers who have a vocation outside the sphere of the accounting profession. This approach views IC as the positive difference between

market and book value of an enterprise [22], [44], [54], [56]. However, this approach does not provide precise and clear directions about what are the elements of this equation. On the other hand, researchers in the field of accounting define the difference between market and book value of assets, which can be disclosed, as goodwill [6], [23], [46]. Seen from the accounting point of view, it seems that goodwill represents IC, or a portion thereof. However, the goodwill may be generated internally or externally, but according to accounting conventions, only externally generated goodwill may be disclosed in the financial statements, properly valued, and amortized at the end of the prescribed period. Everything above leads to the conclusion that goodwill is equal to IC of an enterprise. This conclusion can be accepted only partially since IC is a much broader concept.

When defining IC, there is a general tacit agreement that it is a non-monetary asset without physical substance but has value and potential to generate future benefits for the enterprise. *Hall* [28] observed IC as a collection of contemporary value drivers, which productively transform resources into tangible assets with extra value. IC is responsible for creating the intellectual comparative advantage, which is the main source of sustainable competitive advantage. *Brooking* [11] defines IC as a set of "market resources", "employee-related resources", "property-related intellectual property", and "infrastructure assets", which, when properly connected to other productive resources of an enterprise, most likely would lead to value creation. *Edvinsson* [21] states that IC is not an objective thing but rather a matter of relationships with customers and employees. Specifically, he looks at IC as something borrowed from employees and customers. *Bontis* [7] argues that IC has such attributes that can lead to increase in enterprise value. *Stewart* [54] observed IC as a "collective brain power" of companies, which includes knowledge, information, intellectual property, and expertise used in the process of value creation. *Sullivan* [55] defines IC as knowledge that can be transformed into profit. Creating value in an enterprise depends on the profit generated by selling products and services. Furthermore, the sale of products and services directly depends on intangible assets such as reputation, customer loyalty, brand recognition,

or leadership. These are substantially dependent on the human capital of the organization. *Lev* [37] observes IC as a set of resources that will lead to future benefits for the enterprise. He points out that the IC consists of the existing knowledge within the organization that is used to create a competitive advantage.

Definitions of IC differ in certain formal and substantive parts when the authors belong to the field of financial reporting. The International Accounting Standards Board, (IASB) within International Accounting Standard No. 38 (IAS 38) defines intangible assets as non-monetary asset without physical form, which is held for the production of products and services, for rental to third parties, or for administrative purposes. In addition, the aforementioned standard defines intangible assets through the inclusion of the costs of advertising, training, start-ups and research and development [29]. This standard includes a number of activities that can be characterized as intangible assets. What they have in common is the expectation of the capitalization of future benefits. Activities that are generally expected to bring benefit in the future are marketing, distribution, investment in human resources, research and development, brand, copyrights, franchises, trademarks, licenses, rights management, patents, secret processes, and trademarks. Working group on intangible assets of the German association *Schmalenbach Society* defines intangible assets as intangible objects that do not have monetary value or physical expression [4], [17]. From this, it can be deduced that the IC comes from the capitalization of costs of marketing, training, start-ups, research and development, investment in human resources, organizational structure, and the values arising from brands, copyrights, franchises, licenses, rights management, patents, secret processes, and trademarks. The accounting approach to defining and reporting on intangible assets is concrete and specific in the area of its recording and disclosure. In fact, in order for certain element of intangible assets to be expressed in financial statements, it is necessary that there was a historical cost at the time of purchase. Only those elements of intangible assets that can be expressed quantitatively and are externally generated can be capitalized in the balance sheet of the company [14].

The importance of intellectual capital and its elements

During the industrial era, the core value-creation process was good management of material assets of an enterprise (manufacturing plants, points of sale, inventory levels, land, office space, financial resources). The process of creating value in the information age is characterized by the management of intangible assets. As a result, the content of many jobs has significantly changed in the information age. In the period from 1990 until 1999, the share of workers who have been described as professional creative workers increased from 0.7% to 5.7%. Creative workers generate and use IC and include architects, engineers, mathematicians, experts in information and communication technology, experts from the social and natural sciences, city planners, writers, artists, entertainers, and athletes. Until 1999, the U.S. economy, employed 7.6 million of professional creative workers. The largest increase in the value of IC, as well as the growth of its impact on business performance, became evident in the mid-1980s of the last century, with the advent of large “immaterial industries” such as software, biotechnology, and internet-based industries. The growth and importance of IC has continued until today [45].

Investments in IC have become a basic indicator of the vitality of an enterprise and a key measure of future performance. Research shows that IC has significant impact on productivity growth. In the United States, since 1973 until 1995, the IC, on average, contributed 0.4 percentage points to the annual growth of productivity of human labor. This contribution has increased in the period since 1995 until 2003 to 0.8 percentage points. In France, in the period from 1995-2003, IC contributed to an annual increase in productivity of human labor for 0.9%. In Germany, this contribution amounted to 0.6 percentage points, in Italy 0.4, and Spain 0.2 percentage points [16]. In the UK, in the period 1979-1995, IC contributed to an increase in productivity of 0.4 percent per year on average, while in the period since 1995-2003 this number increased to 0.6 [40]. In Finland, IC increased productivity by an average of 0.6 percent per year in the period 1995-2000.

From 2000 to 2005, a year-to-year increase was an average of 0.9 percent [30].

Regarding the elements of IC, the classification that is often cited is a tripartite categorization provided under the Guidelines for managing and reporting on intangibles (MERITUM Guidelines) [43, pp. 10-11]. According to this categorization, IC is divided into the following constituent elements: human capital, structural capital, and relational capital. Human capital is defined as the knowledge that employees take with them when they leave the company. It includes knowledge, skills, experience, and abilities. The examples of human capital are innovation capacity, know-how, previous experience, teamwork, flexibility, employees, tolerance, motivation, satisfaction, learning capacity, loyalty, formal training, and education. The second category of IC, structural capital is defined as the knowledge that remains in the enterprise when a working day ends. Structural capital consists of organizational routines, procedures, systems, corporate culture, databases, and the like. The last category of IC is relational capital. Relational capital can be defined as a set of resources that includes relationships an enterprise can achieve with external stakeholders (customers, suppliers, and partners). Examples of relational capital are image, customer loyalty, relationships with suppliers, customer satisfaction, market position, bargaining power, activities related to environmental protection, and the like. Classifications of IC are also mentioned in several other literature references [8], [52].

Methods for measuring intellectual capital

What characterizes the area of measurement of IC is a wide range of approaches to this problem. Because there is still no completely acceptable system of measuring IC, interest in this area is not abating. During the last three decades, a number of different methods for measuring IC, based on non-financial and financial performance measures, were developed. All measurement methods can be classified into four major categories [51, pp. 247-255]: direct intellectual capital methods (DICM), market capitalization methods (MCM), ROA methods, and scorecard methods. The first three groups of IC measurement methods result in

financial value, while the last group indicates the non-financial value of IC and thus focuses on non-financial measures. What is important to note when measuring IC is that it is a process consisting of several stages. The first stage involves the visualization of IC and its components. The result of this stage depends on the adopted definition of IC, the characteristics of the business model, and the needs of the enterprise. The second stage refers to understanding IC. This stage entails the identification and conceptualization of the ways in which enterprise can create value by exploitation of IC. The last stage of the measurement process determines the size of IC. During this stage, management selects and applies specific methods and selected measures, and reports of IC [25].

The first group of methods for IC measurement includes *direct measurement methods*. This group of methods is characterized by the need to estimate the size of individual elements of IC in monetary units. Prerequisites for the application of direct measurement methods are adequate identification of IC elements and their individual valuation. At this point, we get the aggregate amount of the value of IC components, which expresses the size of the IC of a particular enterprise. Direct methods aim at providing detailed view of size and vitality of IC and may be applied at each organizational level. Compared to ROA methods and market capitalization methods, the direct measurement methods are based on the “bottom-up” approach of measuring and hence are more efficient and accurate in determining the value of IC [51, p. 248].

When using *market capitalization methods*, market value of an enterprise is initial entry into the calculation of the size of IC. Financial reports indicate the value of the tangible assets of an enterprise, such as manufacturing plants, equipment, cash, securities, stock, but do not take into account the value of IC such as knowledge, organizational structure, brand value, patents, copyrights, database, customer relations, and the like. Because of this, the book value of the enterprise in practice has never been equal to its market value. The difference between market and book value is positive in cases of successful companies. The existence of this positive difference indicates two things. First, there are assets in addition to tangible assets found on the balance sheet that make

investors believe that the enterprise will generate returns in the future. Second, the company is worth more on the stock market than it is worth according to its financial statements. If we assume that the market value of the enterprise is accurate, then this positive difference can be characterized as IC. In addition to absolute values, the ratio between market and book values can be used as a proxy for IC value. For example, in 2007, Microsoft had 8.5 times greater market value than its book value. On the other hand, General Motors had this indicator at the level of -5.1 [1, pp. 139-140].

Return on assets methods (ROA methods) have one characteristic in common and that is a way of calculating the size of IC, which does not always imply that the return on assets is used. Methods that belong to this group calculate the value of IC or its contribution to value creation by using the data from financial statements of an enterprise. This causes several advantages for these methods. First, these methods are relatively easy to implement and because of this, they are often used in practice. Another advantage is the verifiability of the results obtained in this manner. In addition, ROA methods fit into the logic of the accounting profession and therefore it is easy to understand and interpret the results. These methods are especially useful in cases of mergers and acquisitions because they enable relatively easy comparison of IC performance for subjects of transactions. In addition to the undeniable advantages they possess, ROA methods have a number of shortcomings that must be addressed. One of the main disadvantages is the problem of determining the cost of capital, which is a major input for the calculation of the value of IC in certain methods of this group. In addition to this issue, some ROA methods are not suitable for use in non-profit organizations, individual business units, governmental and non-governmental organizations.

Value Added Intellectual Coefficient (VAIC) is a measurement method introduced by *Ante Pulic* [48], [49], [50]. VAIC belongs to ROA methods. Within this segment of the paper the essence and calculation of VAIC coefficient will be presented in detail since it is the basis for empirical research studies that will be addressed in the next section. This measurement method is based on the degree of achieved value added (VA). The basic

premise of the method is that one must start from relative contribution of each type of asset to creation of VA in order to determine the separate contribution of tangible and intangible assets. VA is calculated as follows:

$$VA = OUT - IN$$

In the previous equation OUT represents the output of operations expressed by the total sales revenue. IN indicates the inputs that have been made to generate sales revenue. The inputs include all expenses except for the costs associated with human resources. Employee-related costs are here treated as an investment, not as an expense. Alternatively, VA is calculated as a sum of operating profit (OP), employee costs (EC), and depreciation and amortization expense (A and D). Alternative formula for calculating VA looks like the following:

$$VA = OP + EC + A + D$$

Inputs for the calculation of VAIC are to be found in the income statement and balance sheet of enterprises. It is important to note that staff costs are added back to operating profit because they are seen as an investment, not an expense, and are a kind of property. According to this method, IC is composed of human and structural capital. The author believes that these two elements contribute most to the creation of VA within the enterprise, without taking into consideration external (market) value of the enterprise, as well as the aspect of relational capital. In addition, VAIC is a measure of the contribution, and does not measure the absolute value of its tangible and intangible assets. Therefore, VAIC is the sum of the efficiency of human, structural, and physical capital in the creation of VA.

The first element of VAIC is the coefficient of human capital efficiency (HCE). HCE calculation starts from all forms of employee benefits (compensations). In calculating the human capital efficiency of the enterprise, a ratio between generated value added and investments in human resources is used:

$$HCE = VA/HC$$

HC is human capital, which includes the total earnings of employees during the fiscal year. The next component of IC, structural capital, is represented by the existing hardware, software, organizational structure, patents, and

trademarks. The coefficient of structural capital efficiency (SCE) is obtained as follows:

$$SCE = SC/VA$$

The logic of calculating the contribution of structural capital presented by the above equation is explained by the fact that structural capital (indicated in the equation as SC) is obtained by subtracting the costs of human resources from VA. In other words, the SCE is a measure that is inversely proportional to HCE:

$$VA = HCE + SCE = VA/HC + SC/VA$$

According to the method, which was promoted by *Pulic*, the measure of IC effectiveness in the enterprise is the intellectual capital efficiency (ICE), which is calculated as the sum of human capital efficiency and structural capital efficiency:

$$ICE = HCE + SCE$$

Finally, the coefficient of capital employed efficiency (CEE) is calculated by the division of value added (VA) with a book value of net assets or equity. The following equation illustrates the calculation of this ratio, where the capital already invested in the company is labeled CE (capital employed):

$$CEE = VA/CE$$

Input for calculation of CEE is obtained from the balance sheets of an enterprise. The last step in the calculation is summing the values of intellectual capital efficiency coefficient and the coefficient of efficiency of physical capital in order to obtain the value for VAIC coefficient, i.e.:

$$VAIC = ICE + CEE, \text{ or } VAIC = HCE + SCE + CEE$$

VAIC coefficient indicates the amount of value created per monetary unit invested in tangible and intangible resources of the enterprise. The method of measuring the IC contribution to the process of value creation in the enterprise that *Pulic* introduced is gaining in popularity because of its simplicity, verifiability of data, and possibility of comparison between the performance of different companies and industries. An interesting fact is that the VAIC measurement method was accepted by the previous Department for Business, Enterprise, and Regulatory Reform (BERR) as well as by the Department for Innovation, Universities and Skills, which contributed

to the model being seen as valid and significantly spread in professional and academic circles.

The most significant disadvantage of VAIC method is the fact that the inputs for the calculation are found in the financial statements of an enterprise, which indicates that this indicator measures the value created in the past, and does not measure the potential of value creation in the future. Another disadvantage of VAIC, and that goes for all other methods of IC measurement, is the inability of the model to include the synergy effects arising from the interaction between the various components of intangible assets. VAIC method clearly indicates the contribution of individual components of intangible assets to value creation. However, in practice, the various elements of intangible assets are in mutual interaction, making it impossible to accurately calculate the individual contribution to the creation of added value. In addition to these shortcomings, the model does not offer a solution for the analysis of creating added value for those companies that have losses. In these cases, the value for the VA and for all elements of VAIC (HCE, SCE, and CEE) would also have a negative value, which would result in useless analysis [13].

The last group of models for measuring IC is the one that relies on the collection of data regarding the elements of IC. Afterwards, resulting indicators are often presented in the form of a list of results (scorecard) or in the form of graphs. *Scorecard models* are similar to direct measurement methods, with the difference that in the scorecard model the monetary value of IC is not determined. Instead, these methods at best can create some composite IC index. Scorecard models can be easily applied to any organizational level. These methods use a “bottom-up” approach in identifying the elements of IC, which provides a more detailed, more accurate, and faster display of this category of assets, comparing to ROA or market capitalization methods. Since scorecard models do not provide a monetary value of IC, they are very suitable for use in the nonprofit sector, analysis of business units, government agencies as well as in environmental and social sciences. The main drawbacks of scorecard models are their contextual nature and identification of different types of IC from company to company, which makes any

comparison of performance in this regard more difficult. The main problem with the use of these models is the inability to connect them with tangible, financial, and operating results [51, pp. 248-249].

The impact of intellectual capital on corporate performance in Serbia

Numerous research studies have dealt with the influence of IC on the financial and market performance of enterprises. In most cases, it is concluded that there is a positive correlation between the components of IC and financial and market performance of companies. One such study was conducted by *Firer and Williams* [24] on a sample of 75 companies listed on the Johannesburg Stock Exchange. The study showed that during the period when the survey was conducted South Africa's economy still predominantly relied on the exploitation of natural resources and that enterprises there gained competitive advantage in that respect. Interestingly, a study conducted in Taiwan [12] indicated the positive impact of IC, denominated by VAIC, on the market and financial performance. A study conducted in Malaysia [26] dealt with the investigation of the efficiency of IC in the banking sector. The result

of the study was that domestic banks are generally less efficient in the exploitation of IC compared to banks with the majority of foreign ownership.

Although the most common result of these research studies was that there is a positive correlation between the components of IC and other variables used in measuring performance, as well as the strong influence of the individual components of IC on selected measures of business performance, there are research studies in which it was shown that IC does not affect business performance significantly (regardless of industry in which they operate), despite a relatively large number of units in the sample. Table 1 provides an overview of several major studies of the relationship between IC and corporate performance, together with the presentation of the country/region where the research was conducted, a description and sample size, as well as findings pointing out whether the impact of IC on company performance is unequivocally demonstrated.

On the territory of the Republic of Serbia, six significant empirical studies were conducted on different samples and at different periods, with one important common characteristic – they all applied identical research methodology. In fact, studies have used the concept of measuring the efficiency of the use of IC through VAIC

Table 1: Summary of significant research studies on the impact of IC on corporate performance

No.	Authors	Year	Country/Region	Sample description	Sample size	Unequivocally confirmed
1.	Bontis et al.	2000	Malaysia	The sample was composed of companies in two industrial sectors, the survey was conducted using questionnaire	107	Yes
2.	Firer and Williams	2003	South Africa	Companies listed on the Johannesburg Stock Exchange	75	No
3.	Seleim et al.	2004	Egypt	Software companies	107	Yes
4.	Mavridis	2004	Japan	Banking sector	141	Yes
5.	Chen et al.	2005	Taiwan	Companies listed on the Stock Exchange, different industries	4,254	Yes
6.	Goh	2005	Malaysia	Banking sector, ten domestic, six foreign banks	16	Yes
7.	Kujansivu and Lonnqvist	2007	Finland	Covered 11 industries, regardless of company size	20,000	No
8.	Tovstiga and Tulugurova	2007	Russia	Technology-intensive enterprises	20	Yes
9.	Kamath	2007	India	Banking sector	98	Yes
10.	Tan et al.	2007	Singapore	Companies listed on the Stock Exchange	150	No
11.	Yalama and Coskun	2007	Turkey	Banks listed on the Istanbul Stock Exchange	18	Yes
12.	Moeller	2009	Germany	Business networks in Germany	100	Yes
13.	Ting and Lean	2009	Malaysia	Financial institutions	20	Yes
14.	Zeghal and Maaloul	2010	Great Britain	Companies in the sector of high technology and traditional service sector	300	Yes
15.	Diez et al.	2010	Spain	Companies with more than 25 employees	211	No
16.	Chiu et al.	2011	China	All companies from the Hong Kong Stock Exchange	333	Yes
17.	Maditinos et al.	2011	Greece	Companies from the four industries listed on the Athens Stock Exchange	96	No
18.	Clarke et al.	2011	Australia	Companies listed on the Australian Stock Exchange	2,161	No

coefficient. The analyzed empirical research studies conducted in Serbia are given in Table 2.

In the case of companies in the BELEX15 group, study also failed to demonstrate the existence of strong relationship between VAIC coefficient and corporate performance measured by return on equity (ROE), return on assets (ROA), and employee productivity (EP). In determining the nature and form of the relationship between ROE and ROA and changes in values of VAIC in the case of these 15 companies, only structural capital has significant impact on ROE. In addition to this, the impact of human capital on the productivity of employees was determined. In terms of banking sector in Serbia, there was a significant correlation between total assets, ROA, ROE, and EP, and all the components of IC. However, such a correlation was not identified in the case of Serbian banks' profitability. On the other hand, regression analysis lead to the conclusion that when banks in Serbia are concerned, structural capital has a dominant impact on corporate performance, while the EP was mostly affected by human capital. In case of the top Serbian exporters,

similar to banks in Serbia, the strongest relative impact on financial performance (measured by ROE, ROA, and profitability) was exercised by structural capital efficiency. Human capital determines ROA and EP, while physical capital predominantly affected ROE and profitability.

Within two studies that treated the real sector and companies with the highest net profit in 2010 and 2011, strong enough link between IC and financial performance was not established. The results of these two studies suggest that business success, measured by net income, operating income and operating profit, is in no way determined by the elements of IC. Unfortunately, this leads to the conclusion that commercial success is caused by factors that do not fall under the category of contemporary good practice. The current state of affairs in the Serbian economy reflects a situation in which corporate performance is influenced to a much lesser extent by certain specific knowledge and skills. In other words, the performance of companies still depends mainly on the physical assets of an enterprise, location value, and potential market position that have a tinge of monopoly (or oligopoly).

Table 2: Summary of significant research studies on the impact of IC on corporate performance carried out in Serbia

No.	Authors	Year	Sample description	Sample size	Unequivocally confirmed
1.	Janošević and Dženopoljac	2012	Companies with the highest trade rates on the Belgrade Stock Exchange (BELEX15), 2007-2010	15	No, among IC components, structural capital has the most significant impact on ROE and ROA; in contrast, human capital and physical capital have a weak influence on these two variables but strongly affect EP.
2.	Janošević and Dženopoljac	2011	Serbian companies in the real sector that achieved the highest net profits in 2010	100	No, IC has small or irrelevant impact on financial performance.
3.	Janošević et al.	2011	Serbian companies from the industrial sector that had achieved the highest net profits in 2011	100	No, business performance is mainly influenced by physical capital and a small amount by structural capital.
4.	Janošević and Dženopoljac	2012	Serbian top performing companies in terms of export in 2011	300	No. The study confirmed that return on assets is under significant impact of human capital component as well as structural capital segment of VAIC. Human capital also influences employee productivity. In addition, structural capital significantly determines the values of return on assets and profitability, while capital employed efficiency affects return on equity and profitability.
5.	Bontis et al.	2013	Serbian banking sector, 2008-2011	33	No. Human capital influences only employee productivity. Structural capital plays important role in value creation that results in higher values of total assets and ROE. Finally, physical capital dominantly influences profitability and ROE.
6.	Dženopoljac	2010-2012	Companies from Belgrade Stock Exchange that made up the BELEX line index	54	Research showed that the elements of IC (human and structural capital) have a significant impact on two out of the three indicators of financial performance, whereas only human capital has a positive impact on market performance. Conversely, the impact of physical capital is evident only when we look at the market performance of the listed companies. In terms of financial performance, physical capital determines only the return on equity.

In the case of research conducted on a sample of 54 companies that constitute BELEXline index of Belgrade Stock Exchange, the results revealed that there was positive impact of human capital on market performance, while the impact of structural capital was statistically insignificant. This implied that the knowledge, skills, enthusiasm, talent, and other elements of human capital determined the market performance expressed by MB (Market-to-Book) ratio. On the other hand, physical capital also plays an important role in achieving market performance of companies in Serbia. It is important to note that the impact of physical capital is more significant than the impact of human capital. Thus, the largest relative contribution to the creation of value has physical capital, and secondly human capital.

The BELEXline survey results, as in the case of market performance, showed that the human capital coefficient significantly affects financial performance, measured by ROA and EP. Statistically significant impact of human capital on ROE was not determined. When it comes to the impact of structural capital on financial performance, the study demonstrated statistically significant impact of this element of IC on ROE and ROA. However, the impact of structural capital is stronger with ROE, but the regression model in the case is of lower quality. When observing ROA, the model fit is higher but the impact of structural capital is less intense. On the other hand, employee productivity is independent of structural capital. Physical capital significantly affects ROE, while the impact on ROA and EP is not determined. It is also important to note that the impact of physical capital on ROE is reciprocal. In other

words, the lower the physical capital efficiency ratio, ROE increases. Finally, the overall conclusion of the research is the observation that the elements of IC (human and structural capital) have significant impact on two out of three indicators of financial performance, while only human capital determines market performance. On the other hand, there is significant influence of physical assets, but only in the case of one out of three indicators of financial performance, whereas the market performance is still under the influence of this component of VAIC.

Since all the above studies include return on equity (ROE) and return on assets (ROA) as the dependent variables, the impact of IC on corporate performance of investigated companies will be displayed through the two common denominators. The aim of this analysis is comparing statistically significant impact IC components on financial performance of enterprises in Serbia. Along with presenting the influence of components of IC on these rates of return, there will be an analysis of physical and financial capital impact on the defined indicators of financial performance. Figures 1 and 2 present mentioned comparative analysis, whereby the analysis of the impact of VAIC components on ROE is presented in Figure 1, and Figure 2 shows the impact of these components on ROA.

The results of the implemented research studies into the IC impact on ROE have several common characteristics. First, the influence of human capital efficiency on ROE is statistically insignificant in almost all studies, except in the case of the study conducted on the sample of 100 companies with the largest amount of net profit in 2010. Second, structural capital has statistically significant effect

Figure 1: The impact of IC on ROE

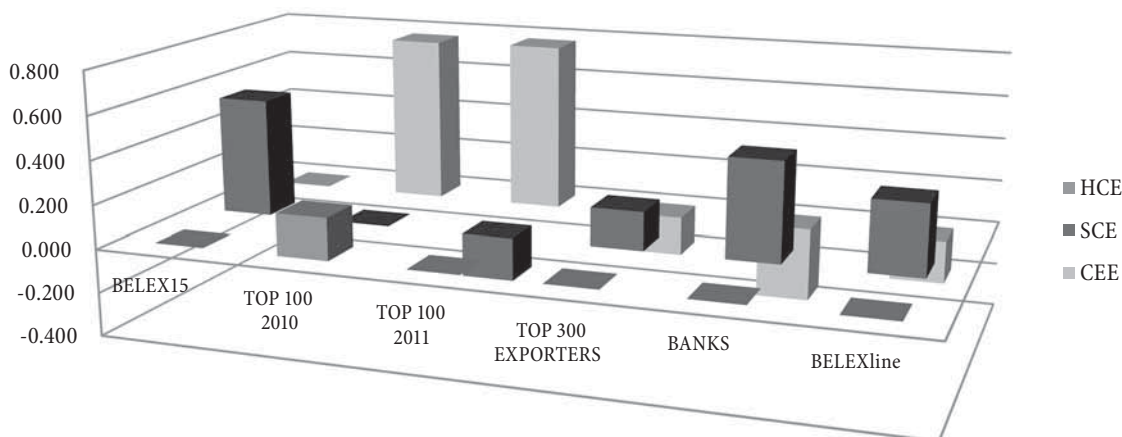
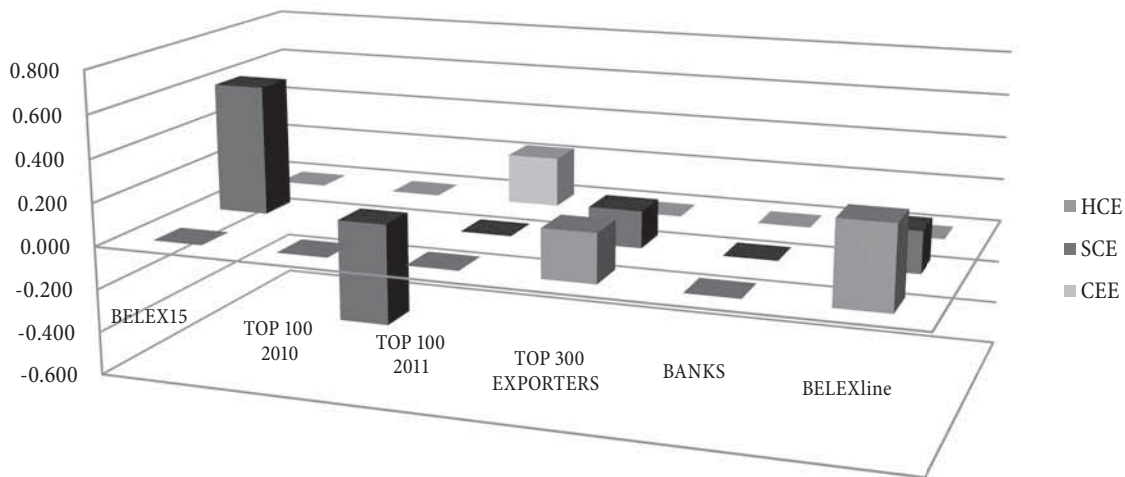


Figure 2: The impact of IC on ROA



on ROE in five out of six research studies. The only time that structural capital has not demonstrated significant impact on ROE is the case of 100 companies with the highest net profit in 2010. Third, the impact of physical and financial capital is significant in five out of six studies. We should note that in case of 300 largest exporters in Serbia, banking sector, and companies from the BELEXline group the IC impact on ROE is inverse. Only in the case of companies from the BELEX15 group, the impact of physical capital on ROE was irrelevant.

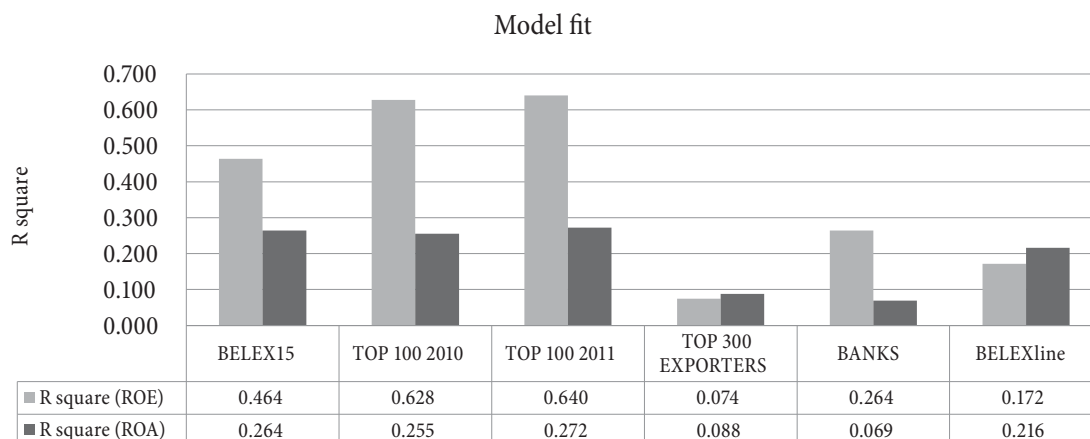
Figure 2 shows the influence of VAIC components on ROA and reveals somewhat different results, comparing to the IC impact on ROE. First, the impact of human capital on ROA is significant only in the case of the largest exporters and companies from BELEXline group. Second, structural capital plays an important role in the case of 15 companies that constituted BELEX15 index, 100 companies with the highest net profit in 2010, biggest exporters in Serbia, and

companies from BELEXline group. Third, physical capital only significantly determined the value of ROA in case of 100 largest companies by net profit in 2011.

In order to support the results of these research studies in Serbia, Figure 3 gives a comparative view of the value of R² (R square), which describes the extent to which the selected independent variables (components VAIC coefficient) efficiently describe the change in dependent variables (ROE and ROA). Figure 3 shows that the regression models that entail ROE are on average more valid than those that analyze ROA.

In addition to the common dependent variables, presented empirical studies used other indicators of financial and market performance. Thus, in the case of companies in the group BELEX15, impact of IC on employee productivity was analyzed and the results suggested that this indicator was under significant impact of human and physical capital. In the case of companies that achieved the

Figure 3: Validity of regression models used in research studies



highest net profit in 2010, the impact of IC on net income, operating income, and operating profit was investigated but a significant impact of components of VAIC coefficient was not determined.

For companies with the highest net profit of 2011 it was determined that structural and physical capital had significant impact on profitability. When discussing 300 largest exporters in Serbia it was revealed that human capital determined the productivity of employees, while structural and physical capital affect profitability. In the case of the banking sector, in addition to analyzing the impact of components of VAIC on ROE and ROA, the significant impact of human capital on employee productivity was implied, as well as the impact of structural capital on total assets, and physical capital on profitability. Finally, in the case of 54 companies from the BELEXline group, it was shown that components of human and physical capital determine the value of MB ratio, while only human capital significantly affects the productivity of employees.

Discussion and conclusion

Intangible resources of enterprises are the substance of IC, which is the primary driver of value in today's knowledge-based economy. The meaning of the term "immaterial" indicates that something is intangible, vague, difficult to define or understand, surreal and that it cannot be accurately measured. The nature of IC affects the complexity of its reporting and evaluation, especially determining its impact on corporate performance. There is no doubt that IC represents potential source of competitive advantage and future growth in value. However, it rarely directly affects the creation of value, thus the value that is created using IC is indirect. In order to enable the creation of value with IC, it is essential that it is properly defined, categorized, measured, accounted for, and connected with the strategy.

The various components of IC (knowledge, skills, talent and enthusiasm of employees, patents, know-how, software, databases, management processes, corporate strategies and plans, close relationships with customers, brand, unique organizational routines, corporate culture) can be categorized as human, structural, and relational capital. These different components of IC are related to

each other as well as with the various components of physical and financial property.

Management of IC and research on its impact on corporate performance and, consequently, the value creation process, necessitate the measurement of IC. IC can be measured in several ways. First, one can identify the individual components of IC, assess their value based on pre-defined indicators, and thus determine the aggregate value of IC at the enterprise level. For the purpose of this kind of measurement the direct measurement methods were developed. Another way of measuring implies comparison of book value of an enterprise with its market value. If the market value is valued more than the book value of equity, this difference may be denoted as IC. Third, the size of the IC can be obtained by analyzing data from official financial statements. By analyzing certain items in the financial statements, which are treated as components of IC (such as goodwill, research and development costs, labor costs), and comparing them to the same positions of other companies, one can estimate the size and efficiency of the exploitation of IC. The application of VAIC coefficient is useful for this purpose because it analyzes the efficiency of IC and compares it with the efficiency of tangible assets in a single enterprise, with the ultimate goal of determining the relative contributions of these assets on value creation. Finally, it is possible to visually observe and monitor IC by using various scorecard models.

Besides definition, classification, and measurement, IC must be coupled with strategy to create added value. In order to connect IC with strategy, it is necessary to understand and properly display the feedback that exists between strategy and IC. Despite its conceptual logic and connection with IC, resource-based view of the firm shows the inability to indicate the ways in which it is necessary to mobilize, guide, and manage tangible and intangible resources in the process of value creation. Therefore, strategy, as the core planning decision, has the task to coordinate the aforementioned resources and focus them towards the realization of defined goals. The developed measurement models tend to allow the efficient and effective management of IC.

Numerous research studies have dealt with the relationship between IC and financial and market

performance of enterprises, with the aim of reviewing the contribution of IC to value creation. In most cases, it was shown that there was a positive correlation between the components of IC and financial and market performance. This was one of the reasons to analyze the results of the research studies conducted in Serbia in order to compare the results with the results of research conducted in other countries. Since Serbia is a country whose economy is not yet based on knowledge, the presented results are logical. The general conclusion that can be drawn is that IC is not the major driver of corporate performance of enterprises in Serbia. Still the corporate performance (in most cases) is significantly determined by physical and financial resources, rather than intangible ones.

The conducted research studies in Serbia open space for new research endeavors in the future. Firstly, research can go in the direction of creating quality measures of IC size and its efficient use in enterprises, which would have greater applicability in practice. Secondly, the question of IC influence on corporate performance represents an issue of great importance for the national economy as a whole, so future research can focus on determining the effectiveness of IC at the national level.

References

- Afuah, A. (2009). *Strategic innovation: New game strategies for competitive advantage*. New York: Routledge.
- Amit, R., & Schoemaker, P. J. H. (1993). Strategic assets and organizational rent. *Strategic Management Journal*, 14, 33-46.
- Andriessen, D., & Tissen, R. (2000). *Weightless wealth: Find your real value in a future of intangible assets*. Harlow: Pearson Education Limited.
- Arbeitskreis Immaterielle Werte im Rechnungswesen der Schmalenbach-Gesellschaft für Betriebswirtschaft e.V. (2001). *Kategorisierung und bilanzielle Erfassung immaterieller Werte*.
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Beaver, W. H. (1998). *Financial reporting: An accounting revolution*. Upper Saddle River, NJ: Prentice-Hall International.
- Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models. *Management Decision*, 36(2), 63-76.
- Bontis, N. (2001). Assessing knowledge assets: A review of the models used to measure intellectual capital. *International Journal of Management Reviews*, 3(1), 41-60.
- Bontis, N., Janošević, S., & Dženopoljac, V. (2013). Intellectual capital and the corporate performance of Serbian banks. *Actual Problems of Economics*, 4, 287-299.
- Bontis, N., Keow, W. C. C., & Richardson, S. (2000). Intellectual capital and business performance in Maysian industries. *Journal of Intellectual Capital*, 1(1), 85-100.
- Brooking, A. (1997). *Intellectual capital: Core asset for the third millennium enterprise*. London: Thomson Business Press.
- Chen, M., Cheng, S., & Hwang, Y. (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. *Journal of Intellectual Capital*, 6(2), 159-176.
- Chiu, S. K. W., Chan, K. H., & Wu, W. W. Y. (2011). Charting intellectual capital performance of the gateway to China. *Journal of Intellectual Capital*, 12(2), 249-276.
- Choong, K. K. (2008). Intellectual capital: Definitions, categorization, and reporting models. *Journal of Intellectual Capital*, 9(4), 609-638.
- Clarke, M., Seng, D., & Whiting, R. H. (2011). Intellectual capital and firm performance in Australia. *Journal of Intellectual Capital*, 12(4), 505-530.
- Corrado, C., Hulten, C., & Sichel, D. (2006). *Intangible capital and economic growth* (Finance and Economics Discussion Series No. 24). Washington, DC: The Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board.
- Crasselt, N., & Schremper, R. (2000). *Economic Value Added*. DBW, Anaheim, CA, DB, Heft 19.
- Diez, J. M., Ochoa, M. L., Prieto, M. B., & Santidrian, A. (2010). Intellectual capital and value creation in Spanish firms. *Journal of Intellectual Capital*, 11(3), 348-367.
- Đuričin, D., Janošević, S., & Kaličanin, Đ. (2013). *Menadžment i strategija* (osmo prerađeno i dopunjeno izdanje). Beograd: Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu.
- Dženopoljac, V. (2013). *Uticaj nematerijalne aktive preduzeća na proces stvaranja vrednosti* (doktorska disertacija). Kragujevac: Ekonomski fakultet.
- Edvinsson, L. (1997). Developing intellectual capital at Skandia. *Long Range Planning*, 30(3), 320-331.
- Edvinsson, L., & Malone, M. S. (1997). *Intellectual capital: Realizing your company's true value by finding its hidden brainpower*. New York: Harper Business.
- Feltham, G. A., & Ohlson, J. A. (1996). Uncertainty resolution and the theory of depreciation measurement. *Journal of Accounting Research*, 34 (2), 209-234.
- Firer, S., & Williams, M. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital*, 4(3), 348-360.
- Giuliani, M., & Marasca, S. (2011). Construction and valuation of intellectual capital: A case study. *Journal of Intellectual Capital*, 12(3), 377-391.
- Goh, P. C. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital*, 6(3), 385-396.
- Grant, R. M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, 33(3), 114-135.
- Hall, R. (1992). The strategic analysis of intangible resources. *Strategic Management Journal*, 13(2), 135-144.
- IASB. (2004). *Intangible assets* (International Accounting Standard (IAS) No. 38). London: International Accounting Standards Board.

30. Jalava, J., Aulin-Ahmavaara, P., & Alanen, A. (2007). *Intangible capital in the Finnish business sector 1975-2005* (ETLA discussion paper No. 1103). Retrieved from http://www.etla.fi/files/1866_Dp1103.pdf
31. Janošević, S., & Dženopoljac, V. (2011). Intellectual capital and financial performance of Serbian companies in the real sector. *Ekonomika preduzeća*, 59(7-8), 352-366.
32. Janošević, S., & Dženopoljac, V. (2012). An investigation of intellectual capital influence on financial performance of top Serbian exporters. *Ekonomika preduzeća*, 60(7-8), 329-342.
33. Janošević, S., & Dženopoljac, V. (2012). Impact of intellectual capital on financial performance of Serbian companies. *Actual Problems of Economics*, 7, 554-564.
34. Janošević, S., Dženopoljac, V., & Tepavac, R. (2012). Corporate performance driven by intellectual capital: An empirical analysis. In D. Tipurić, & M. Dabić (Eds.), *Management, governance, and entrepreneurship – New perspectives and challenges* (pp.136-153). Darwen, UK: CIRU Governance Research and Development Centre & Access Press.
35. Kamath, G. B. (2007). The intellectual capital performance of Indian banking sector. *Journal of Intellectual Capital*, 8(1), 96-123.
36. Kujansivu, P., & Lonnqvist, A. (2004). *The value and efficiency of intellectual capital in Finnish companies*. Tampere: Institute of Industrial Management, Tampere University of Technology.
37. Lev, B. (2001). *Intangibles: Management, measurement, and reporting*. Washington, D.C.: Brookings Institution Press.
38. Lev, B. (2003). Remarks on the measurement, valuation, and reporting of intangible assets. *Economic Policy Review*, 9(3), 17-22.
39. Maditinos, D., Chatzoudes, D., Tsairidis, C., & Therious, G. (2011). The impact of intellectual capital on firms' market value and financial performance. *Journal of Intellectual Capital*, 12(1), 132-151.
40. Marrano, M. G., Haskel, J., & Wallis, G. (2007). *What happened to the Knowledge Economy? ICT, intangible investment and Britain's productivity record revisited* (Working Paper no. 603). Retrieved from <http://www.econ.qmul.ac.uk/papers/doc/wp603.pdf>
41. Mavridis, G. D. (2004). The intellectual capital performance of the Japanese banking sector. *Journal of Intellectual Capital*, 5(1), 92-115.
42. MERITUM. (2002). *Guidelines for managing and reporting on intangibles*. Madrid, Spain: Measuring intangibles to understand and improve innovation management (MERITUM).
43. Moeller, K. (2009). Intangible and financial performance: Causes and effects. *Journal of Intellectual Capital*, 10(2), 224-245.
44. Mouritsen, J., Larsen, H. T., & Bukh, P. N. D. (2001). Intellectual capital and the 'capable firm': Narrating, visualising and numbering for managing knowledge. *Accounting, Organization and Society*, 26(6/7), 735-762.
45. Nakamura, L. (2000). Economics and the new economy: The invisible hand meets creative destruction. *Federal Reserve Bank of Philadelphia Business Review*, July/August, 15-30.
46. Ohlson, J. A. (1995). Earnings, equity book values, and dividends in equity valuation. *Contemporary Accounting Research*, 11(2), 661-687.
47. Prahalad, C. K., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, May-June, 79-91.
48. Pulic, A. (1998). *Measuring the performance of intellectual potential in knowledge economy*. Retrieved from <http://www.vaic-on.net/>
49. Pulic, A. (2002). *Value creation efficiency of Croatian banks 1996-2000*. Retrieved from <http://www.vaic-on.net/>
50. Pulic, A. (2004). Intellectual capital: Does it create or destroy value? *Measuring Business Excellence*, 8(1), 62-68.
51. Roos, G., Pike, S., & Fernström, L. (2005). *Managing intellectual capital in practice*. Oxford: Butterworth-Heinemann.
52. Seetharaman, A., Teng Low, K. L., & Saravanan, A. S. (2004). Comparative justification on intellectual capital. *Journal of Intellectual Capital*, 5(4), 522-539.
53. Seleim, A., Ashour, A., & Bontis, N. (2007). Human capital and organizational performance: A study of Egyptian software companies. *Management Decision*, 45(4), 789-801.
54. Stewart, T. A. (1998). *Intellectual capital: The new wealth of organizations*. London: Nicholas Brealey Publishing.
55. Sullivan, P. H. (2000). *Value-driven intellectual capital: How to convert intangible corporate assets into market value*. New York: John Wiley & Sons, Inc.
56. Sveiby, K. E. (1997). *The new organizational wealth: Managing and measuring knowledge-based assets*. San Francisco: Barlett-Kohler.
57. Tan, H. P., Plowman, D., & Hancock, P. (2007). Intellectual capital and financial returns of companies. *Journal of Intellectual Capital*, 8(1), 76-95.
58. Ting, I. W. K., & Lean, H. H. (2009). Intellectual capital performance of financial institutions in Malaysia. *Journal of Intellectual Capital*, 10(4), 588-599.
59. Tovstiga, G., & Tulugurova, E. (2007). Intellectual capital practices and performance in Russian enterprises. *Journal of Intellectual Capital*, 8(4), 695-707.
60. Yalama, A., & Coskun, M. (2007). Intellectual capital performance of quoted banks on the Istanbul stock exchange market. *Journal of Intellectual Capital*, 8(2), 256-271.
61. Zéghal, D., & Maaloul, A. (2010). Analyzing value added as an indicator of intellectual capital and its consequences on company performance. *Journal of Intellectual Capital*, 11(1), 39-60.



Vladimir Dženopoljac

is an Assistant Professor at the Faculty of Economics, University of Kragujevac, on courses of Strategic management and Business planning and policy, at the bachelor level of studies. At the master degree of studies, he is engaged as an Assistant Professor for Business strategy. Until now, he has published a number of papers in his field of professional expertise, and has been involved in implementation of several projects for Serbian companies. Current areas of professional interest are intellectual capital management and strategic financial management.