Review Paper

THE MICROECONOMIC PERSPECTIVES OF INTELLECTUAL CAPITAL MEASUREMENT

UDC 330.101.542:005.336.4

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Abstract. *Intellectual capital has become a widely studied issue among researchers in the knowledge economy. This is due to the fact that intellectual resources are the main driver of growth and competitiveness in the globalized environment. However, measuring intellectual capital, as an intangible resource, is not an easy task. Researchers have been trying for decades to put in place a measurement system that can provide useful information for managers. Definitely, there are numerous measuring methodologies available, but the list is non-exclusive. Appropriate usage of intellectual capital measuring methodologies enables adequate management of intellectual capital and thus leads to the creation of competitive advantage and value for enterprises and wealth for nations. Therefore, the aim of the paper is to examine various microeconomic measurement methodologies of intellectual capital focusing on the level of organization. The authors critically evaluate numerous noteworthy methods of the intellectual capital appraisal, as well as the indicators used in order to capture the performances of intellectual capital, thus contributing to the improved management of invisible, valuable non-material resources in the process of value creation for various stakeholders and enhancing competitiveness of an enterprise.*

Key words: *intellectual capital, intangible assets, knowledge, knowledge economy, measurement methodologies, competitiveness*

INTRODUCTION

Knowledge, as the most important intellectual resource, is the principal factor which drives the competitiveness of an economy and results in higher living standards for its citizens. Knowledge became the most important factor of economic growth and competitiveness with the process of globalization. Globalization has altered the way in which companies and economies mutually interact, but also the resources which drive growth. Therefore, companies, cities, regions, nations have become aware of the possibility to succeed in the international market by employing and developing a new and unlimited resource – knowledge.

Instead of the simple usage of production factors which a country has in its possession, in the time of the globalized economy, it is of extreme importance how enterprises and countries improve the quality of production factors, increase the productivity of their usage and create new factors. Comparative advantage, which is based on costs of production factors, cannot serve as the base for development strategy in an economy in the long run, since this kind of advantage is threatened by the possibility of appearance in the world market economies with even lower costs of production factors or willingness of governments to subsidies such development strategies (Ivanić & Paunović, 2010, p. 10). Therefore, the competitive advantage must be based on new knowledge and innovations.

The concept of intellectual capital has become a widely studied issue among researchers since the beginning of the 1990s. This concept incorporates three different components at the micro level: human capital, relational capital and structural capital. Once the importance of the concept has been determined at the level of firms, researchers have expanded their research to the level of national economies, especially in investigating the role intellectual capital has in creating and sustaining high positions in the international market. Therefore, the focus has been put on measuring methodologies for valuing this unlimited resource. However, the consensus has not been reached yet due to the immaterial nature of intellectual capital, and this creates a room for further investigation of the issue. In this regard, this study focuses on determining advantages and disadvantages of various measurement methodologies for the purpose of enhancing the intellectual capital management in an enterprise.

The paper is organized in the following manner. The subsequent part focuses on the explanation of knowledge and its use in enhancing economic growth and competitiveness. Afterwards the role of intellectual capital as a source of value creation in the knowledge economy will be elaborated, followed by the motivation for measuring intellectual capital. Subsequently, the methodologies for measuring intellectual capital at micro level will be critically assessed. Finally, the conclusion will summarize the main findings of the paper.

1. KNOWLEDGE AS THE FACTOR OF ECONOMIC GROWTH AND COMPETITIVENESS

In contemporary circumstances, knowledge is spreading increasingly fast. Due to the development of information and communication technologies, information is widely available to everyone, and hence it is hard to be different and unique in the knowledge market economy. Thus, it is of great importance to organize and manage resources in an innovative manner.

All modern companies and countries compete in knowledge. This is because they understand that the only way to reach high positions in the international market is to base production on the intellectual capital and search for new innovative ways of production.

"An economy becomes a knowledge economy by putting knowledge at the centre of the process of economic development" (Krstić & Stanišić, 2013, p. 153).

In the past, the competitiveness of firms and nations was based on comparative advantages they possess. This was in line with Ricardo's theory of comparative advantage. However, globalization of competition and technology has put classical theory in industrial developed countries aside (Rakić & Rađenović, 2016a). Today, the competitiveness of firms and nations is based on competitive advantages they create. This is in line with Porter's view of national competitiveness and his diamond theory. According to Porter (1990), it is necessary to connect and strengthen forces in the diamond to achieve competitive advantage by promoting innovation and progress. This Porter's view is in line with endogenous growth theories in which knowledge represents a key factor of productivity and economic growth.

Knowledge, innovations and networking have become three basic elements of new infrastructure needed for the prosperity in the new knowledge economy (Krstić & Vukadinović, 2009, p. 460). Knowledge, as a factor of production, compensates to some extent for land, labour and other resources. The main characteristic of economic prosperity in the global economy is competitiveness based on knowledge and innovation. This has been well recognised by the OECD, as this organisation considers innovation capacity and marketable innovations to be the crucial determinants of the national competitiveness (2007, p. 3).

After the industrialization era, the knowledge era has taken the throne, and hence the basic source of competitive advantage of a country is knowledge. In contemporary circumstances the wealth of nations, regions, and cities depends on the level of knowledge and its effective and efficient usage (Krstić & Vukadinović, 2009, p. 460). Trends of globalisation and liberalisation of economic and financial flows, as well as constant technological changes have led to the transformation of industrial economies to the knowledge economies (Laroche et al., 1999, p. 88), i.e. shifting focus from natural resources to knowledge and innovation. Knowledge economies are those in which intellectual capital represents a fundamental production factor (Bedford, 2013, p. 278). Production and services based on intellectual capabilities can lead to the accelerated pace of technological and scientific progress (Powell & Snellman, 2004, p. 199).

However, these new technological advances do not have notable value for those countries which do not have educated and trained labour force to use those advances, pointing to the fact that economic growth to a great extent depends on the synergy between new knowledge and human capital (Rakić & Rađenović, 2016b, p. 96). Only those countries in which main technological advances were followed by increased trends of education and training have reached significant economic growth (Becker, 2008).

2. Intellectual Capital as a Source of Value Creation in the Knowledge Economy

The notion of intellectual capital can be traced back to the beginning of the XX century and Taylor's "The Principles of Scientific Management" in 1911 (Kolaković, 2003, p. 927). Although the research on the importance of knowledge can be extended even further in the past, this can be viewed as the first attempt to set scientific explanation of knowledge, experience and skills of employees. Further progress in the economic theory was made by Schumpeter (1934), who emphasised the recombination of knowledge as a necessary precondition for the appearance of new innovative products.

The traditional neoclassical growth model (Solow, 1957) does not explain the major determinants of productivity growth (Viedma Marti & Cabrita, 2012, p. 18). Namely, the huge amount of growth is explained by Solow's residual, the part of output growth that cannot be accounted for by growth in the primary production factors, i.e. capital and labour. This residual capture other exogenous factors that have an influence on growth and is often attributed to technological progress. Hence, in the Solow's growth model technological progress is set as exogenous, and based on the critics of this model new theories have emerged. These new theories observed these other factors as endogenous. The main position is given to human capital in form of accumulated knowledge, education and innovation (Romer, 1986; 1990; Lucas, 1988).

Romer (1986) recognised accumulation of knowledge at all levels as a fundamental driver of economic growth. According to Romer only people can create new ideas that result in the recombination of things and their new usages and thus lead to economic prosperity. In order to support economic growth and development governments in both developed and developing countries have to create the macroeconomic policies that encourage investments in the research and development of new ideas as well as to subsidize the accumulation of total human capital (Romer, 1990, p. S99).

By linking all available analyses and theories of human capital with the ideas and innovations which human capital produces, Romer is perceived as the founder of the new area of research – the concept of intellectual capital (Kolaković, 2003, p. 930). The concept of intellectual capital is firmly based on a modern competitiveness theory.

Although it would be expected to discover the fundamentals of the intellectual capital theory in the managerial and organizational theories, this theory draws its roots from all the above mentioned macroeconomic theories. The intellectual capital theory can be viewed as one of the endogenous theories which is based on premises that the value of an enterprise is generated from human capital, structural capital and relational capital, i.e. when one form of capital is transformed into another form (Kolaković, 2003, p. 925). For example, the value is created when individuals' capabilities (human capital) create new organisational processes (structural capital) resulting in better services for customers and increased loyalty (relational capital).

The first attempt to investigate the growth process in firms can, most likely, be ascribed to Penrose's (1959) effort to visualise the firm's growth as a collective endogenous process in which its participants accumulate valuable knowledge, through a dynamic learning process embedded in the interactions between firm's productive resources and market opportunities. The resource-based theory of the firm (Penrose, 1959; Wernerfelt, 1984; Barney, 1991) views a firm as a unique set of the different resources and capabilities, thus pointing to the fact that the diversity between firms originates from its internal characteristics, i.e. the heterogeneous resources and capabilities it accumulates, improves and uses in the process of value creation.

Apart from the resource-based view, the competitiveness theory involves two other segments: the dynamic capabilities theory and the knowledge-based theory. The dynamic capabilities theory points to the fact that the resources of a firm and their efficient utilization are not enough to achieve sustainable competitive advantage, but specific capabilities of a firm are also required (Krstić, 2007). Teece et al. (1997) observe the dynamic capabilities of a firm as its capacity to integrate, develop and recreate the internal and external competencies to effectively respond to the fast changing environment.

The knowledge-based theory puts emphasis on the knowledge, as an imperfectly imitable resource, which differentiates and provides a competitive advantage (Leonard-Barton, 1992). The proponent of the knowledge-based theory Grant (1996) points to the fact that "the critical input in production and primary source of value is knowledge" (p. 112). This lead to a conclusion that in the constantly changing surroundings, the most successful firms are those which produce original knowledge, spread it within the organization and quickly turn into innovative products.

3. REASONS FOR MEASURING INTELLECTUAL CAPITAL

It is due to its immaterial nature, that intellectual capital is hard to define and even harder to measure. Usually, intellectual capital is observed as the "knowledge that creates value" (Viedma Marti & Cabrita, 2012, p. 69), or "any valuable intangible resource gained through experience and learning that can be used in the production of further wealth" (Marr & Moustaghfir, 2005, p. 1116). Intellectual capital determines the future growth and development perspectives of an enterprise.

Modern knowledge enterprises, with high business performances, have beforehand acknowledged the importance of intellectual capital for their growth and development, and as a result they emphasise the following priority activities (Krstić, 2014, p. 11):

- Identifying and increasing visibility of intellectual resources in the reports of business success and competitiveness;
- Guiding improvement and increase of intellectual capital of an enterprise through professional development, continuous training and education, research and development, cooperation, effective application of information technology and the concept of knowledge management;
- Creating and adding value to products and enterprises by the process of renewing and disseminating knowledge;
- Identifying key intellectual resources of an enterprise for the value increase and with the highest influence on its strategic position, growth and development.

There are several reasons why it is essential for the enterprises in the globalized economy and intensive development of information and communication technologies, to measure the performances of intellectual resources and their intellectual capital, as well as to report on its performances and value. One of the reason is the change in the resource structure of the modern enterprise from tangible resources toward intangible intellectual resources (Krstić, 2014, p. 67). Namely, in the knowledge-based economy the managers of the knowledge enterprises, as well as stakeholders and investors are not content with the traditional measurement and reporting system of intellectual capital, since this system does not offer necessary information for the decision making process.

The traditional measurement and reporting system concentrates on the financial information from official financial reports thus covering only one part of the intellectual resources such as intellectual property identified in the balance sheet of an enterprise. Such a system does not provide room for the monitoring and valuing of the non-financial performances of intellectual resources. However, this does not mean that these intellectual resources do not exist in an enterprise. Contrarily, these resources have to be efficiently managed due to their significance in the process of value creation, and hence in order to

be manageable, these resources have to be monitored, measured and reported about their performances to the internal and external stakeholders.

In the knowledge economy it is evident that the traditional financial reports are far from exact reporting of the real value of a firm, and hence are inadequate starting point for the projections of its future possible business performances and value, especially as knowledge has taken the central place in the process of value creation.

According to Marr et al. (2003) modern enterprises are measuring their intellectual capital because of the following reasons (p. 443):

- Assisting enterprises in the formulation of their strategies;
- Supervising and assessing the implementation of the formulated strategies;
- Facilitating the strategic decision regarding diversification, expansion, integration and development;
- Helping in determining compensation benefits for employees and managers;
- Conveying activities and business performances to the external stakeholders.

The problem of measuring performances of the intellectual capital and its segments comes from the intangible nature of the intellectual resources, but also because the economic outcomes are generated by the interactions and common utilization of diverse resources. Therefore, it is hard to measure value and other performances of any partial component of intellectual capital, but instead it is usually measured as a single aggregate measure (Krstić, 2014).

4. MEASUREMENT METHODOLOGIES AT MICRO LEVEL

There are several different methodologies for measuring unreported, invisible intellectual capital of enterprises. Some are based on the financial approach tending to express the value of intellectual capital or financial value of some of its segments: human, structural or relational, (financial evaluation methodologies), while others do not apt to financially express and quantify the value of intellectual capital, but include various process measures more suitable for the immaterial nature of intellectual capital (non-financial evaluation methodologies) (Krstić, 2014, p. 86). Within these two broad sets of intellectual capital valuation methodologies, further diversification can be found in the literature (Jurczak, 2008; Sveiby, 2010; Pike & Roos, 2004; 2011; Viedma Marti & Cabrita, 2012): Direct Intellectual Capital (*DIC*) methods, Market Capitalisation (*MC*) methods, Return on Assets (*ROA*) methods, Scorecard (*SC*) methods, Proper Measurement Systems (*MS*) and other (see Table 1).

4.1. Direct Intellectual Capital Methods

DIC methods estimate monetary value of intangible resources by identifying and valuing their different constitutive elements, either separately or as one aggregate coefficient. The main representatives of this group of methods are Brooking's *"Technology Broker Intellectual Capital Audit"* (Brooking, 1996), as well as Sullivan's *"Intellectual Asset Valuation"* (Sullivan, 2000). These methods offer a wide range of details and have proved to be very useful for measuring intellectual capital at any level of the organisation (Pike & Roos, 2004). Also, DIC methods are very useful for the non-government organisations, organisational units, government organisations and bodies, as well as, for the ecological, societal and public objectives (Jurczak, 2008). However, the problem with this group of indicators is the concern of comprehensiveness, since even when they tend "to include as

many of the resources as possible, this only addresses the area of intrinsic value leaving the area of resource use or instrumental value unaddressed" (Pike & Roos, 2004, p. 10).

Brooking's *"Intellectual Capital Audit"* differentiates between four components of IC (1996, pp. 13-16):

- Market assets refer to the market-related intangibles such as: brands, consumers, loyalty, distribution channels, licensing, franchise, etc.;
- Human-centred assets involve employee's competences, capabilities, expertise, skills, etc.;
- Intellectual property assets comprise know-how, trade secrets, copyrights, patents, marks, etc.; and
- Infrastructure assets encompass the corporate culture, communication systems, financial structure and other technologies and processes that enables the organisation functioning.

According to this model, the value of intellectual capital is assessed from the analysis of the enterprise's responses to the questionnaire comprising of 20 questions about these four main components of intellectual capital (Komnenić, 2013). This value of intellectual capital is calculated as a monetary value by means of "traditional valuation approaches (market, income or cost) to each category" (Viedma Marti & Cabrita, 2012, p. 152).

Table 1 Methods for Measuring Intellectual Capital

Direct Intellectual Capital Methods	Scorecard Methods
▪ EVVICAETM	▪ ICU Report
▪ Dynamic Monetary Model	▪ Intellectual Asset-based Management (IAbM)
▪ The Value ExplorerTM	▪ SICAP
▪ Intellectual Asset Valuation	▪ Topplinjen/Business IQ
▪ Total Value Creation (TVCTM)	▪ Public Sector IC
▪ Accounting for the Future (AFTF)	▪ Danish Guidelines
▪ Technology Broker (IC Audit)	▪ Dynamic Valuation of Intellectual Capital (IC-dVAL^{TM})
▪ Citation-Weighted Patents	▪ Intellectus Model
▪ HR Statement	▪ IC Rating^{TM}
▪ Human Resource Costing & Accounting (HRCA)	▪ Value Chain Scoreboard^{TM}
▪ Financial Method of Intangible Assets Measuring (FiMIAM)	▪ Meritum Guidelines
Market Capitalisation Methods	▪ Intangible Assets Statement
▪ The Invisible Balance Sheet	▪ Knowledge Audit Cycle
▪ Market-to-Book Value	▪ Value Creation Index (VCI)
▪ Investor Assigned Market Value (IAMVTM)	▪ IC Index^{TM}
▪ Tobin's Q	▪ Holistic Accounts
▪ Calculated Intangible Value	▪ Skandia Navigator^{TM}
Return on Assets Methods	▪ Intangible Asset Monitor (IAM)
● Economic Value Added (EVA^{TM})	▪ Balanced Scorecard
● Calculated Intangible Value (CIV)	▪ German Guideline – ICS Made in Germany
● Knowledge Capital Earnings	▪ Intellectual Capital Benchmarking Systems (ICBS)
● Value Added Intellectual Coefficient (VAIC^{TM})	▪ Measuring and Accounting IC (MAGIC)
● EIC method	▪ InCaS
	Proper Measurement Systems
	● Holistic Value Approach (HVA)
	● Inclusive Value Management (IVM^{TM})

Source: Adapted from Viedma Marti and Cabrita (2012, p. 132)

Sullivan's *"Intellectual Asset Valuation"* measures the market value of the firm as the sum of the values of the tangible assets and intellectual capital, where "the discounted value of the cash flow generated by intellectual capital equals the value of intellectual capital" (Andriessen, 2004, p. 355). According to Sullivan (2000, p. 119) "market capitalization reflects the market's view of two things. First, it reflects the market's understanding of the value of the firm's fixed assets, those found on the company's balance sheet. Second, it reflects the market's intuition or perception of both the amounts of (a company's) Intellectual Capital as well as its ability to leverage that Intellectual Capital in its market place". The Sullivan's method differentiates three earnings streams from: intellectual capital, complementary business assets and structural capital, but without detailed explanation how to isolate and estimate these earnings (Andriessen, 2004).

4.2. Market Capitalisation Methods

MC methods determine the value of intellectual capital as the difference between the market capitalisation value and shareholders' equity value of a company. The robustness of these methods comes from the fact that they rely on financial figures which are, if not ideal, at least auditable and are proven to be useful for the rough comparison of companies from the same industry, although without many details (Jurczak, 2008, p. 41). But, the main weakness of these models comes from the fact that they are trying to link the financial figures with the market share prices that are changing constantly (Pike & Roos, 2004).

The most noticeable method within this group is Market-to-Book Value which evaluates the value of off-balance sheet intellectual capital by calculating the difference between the market value of the shareholders' equity and book value of the firm's net assets (Krstić, 2014, p. 87). This method is easy to implement and enables comparison over time and with other entities. However, this method only evaluates the value of the intellectual capital of the firm, but without determining the value of some of the intellectual capital components. Besides, this method is not reliable due to the daily fluctuations of the share prices (An, 2015).

4.3. Return on Assets Methods

ROA methods are commonly applied for comparison of the ROA between various companies. Return on assets is calculated when the earnings before taxes of an enterprise for a given period is divided by the average value of the total tangible assets reported in the balance sheet (Viedma Marti & Cabrita, 2012, p. 133). The ROA indicator calculated in this manner is then compared with the average ROA of the industry to which that enterprise belongs. In case when the ROA of the enterprise is above the average ROA for the given industry, then the enterprise has generated the extra value that is attributable to the intellectual capital (Krstić, 2014). The opposite is also possible, meaning that when the enterprise's ROA is below the average ROA of a given industry, then the value of intellectual capital does not exist, i.e. it is equal to zero. The difference between the enterprise's ROA and the industry ROA is multiplied with the average value of the tangible assets reported in the balance sheet, in order to determine the part of the earnings that represent the contribution of the intangible assets not reported in the balance sheet, that is the contribution of intellectual capital (Krstić, 2014). The estimated value of the intellectual capital is determined by dividing this part of the earnings with the cost of capital or an interest rate (Jurczak, 2008).

ROA methods provide information based on the financial data and therefore, similar to MC methods, serve as a solid base for the comparison of firms in the same industry. However, these methods are very sensitive to the interest rate assumption and opposite to DIC methods are of no value for the non-profit organisations and government agencies (Roos et al., 2005). For example, the Steward's *"Calculated Intangible Value"* belongs to this group of methods.

The *"Calculated Intangible Value"* method draws its roots from the assumption that the premium on an enterprise value results from its intangible assets (Andriessen, 2004). Steward (1997) illustrates this method through the seven step procedure:

1. Determine the average before tax earnings for a three-year period;
2. Determine the average value of tangible assets over the same period;
3. Compute the ROA;
4. Determine the average industry ROA for the same period;
5. Determine the above-average return of a firm (premium) by multiplying the average industry ROA with the value of the firm's intangible assets and subtracting the result from the before tax earnings;
6. Determine the net premium by multiplying the excess return with the average tax rate;
7. Determine the present value of the net premium by discounting it with a proper discount rate.

This method is a sophisticated method which uses publicly obtainable information to determine the intellectual capital premium, but this calculated intangible value does not reflect the value of all intangible resources, since the earnings from the reported intangibles are not encompassed (Andriessen, 2004).

In the group of ROA methods an interesting methodological framework is developed by Krstić and Bonić (2016) for measuring the efficiency of the total intellectual capital of an enterprise (EIC) by calculating the partial efficiency measures of the intellectual capital components. EIC method combines the financial accounting valuation with the market valuation by determining the value of the intellectual capital from two parts: the intellectual capital disclosed on the balance sheet of a firm and the undisclosed intellectual capital (Krstić & Bonić, 2016). This method is easy to apply especially to the companies listed on the stock exchanges since it is based on the publicly available information, but experience limitations with the companies that are not listed on the market and requires other solutions for the calculation of the market value.

4.4. Scorecard Methods

SC methods include various methods for measuring and reporting on intellectual capital performances, which identify different groups of intellectual resources and offer indicators for their measurement. These methods are to some extent identical to the DIC methods with a difference that they do not make financial valuation and do not provide the aggregate composite index of intellectual capital, but rather a set of partial indicators for each category of intellectual capital according to the basic classification (Krstić, 2014). At the same time these methods are used for the reporting on the performances of intellectual capital, such as the *"Balanced Scorecard"* developed by Kaplan and Norton (1996) and Sveiby's *"Intangible Asset Monitor"* (1997).

These methods provide more information than other methods, can be easily implemented to any organisational level, use a bottom up approach in measuring intellectual resources and are

very useful for non-profit organisations, government bodies and various business units (Roos et al., 2005). However, these methods provide contextual indicators that cannot be compared between organisations and cannot be easily aligned with the financial results (Pike & Roos, 2004).

The *"Balanced Scorecard"* method is a very popular and widely used model that evolved from performance measurement through strategy implementation and management to a management framework for the readiness of intangibles (Kaplan & Norton, 1992; 1996; 2001; 2004). The Balanced Scorecard model interprets the firm's mission and strategy through the broad set of performance measures thus providing the basis for the strategic system of measurement and management (Viedma Marti & Cabrita, 2012). This method "encourages companies to monitor their performance not only from the financial but also from the non-financial perspective, comprising the customer, the internal business process, and the learning and growth perspective" (An, 2015, p. 26). By combining all these perspectives into a comprehensible system, this model facilitates the decision making process of top management by providing powerful analysis of the firm's performances. An efficient Balanced Scorecard model translates the four fundamental components: mission, values, vision and strategy of a firm, "into objectives and key performance indicators based on four different perspectives" (Roos et al., 2005, p. 304).

However, this model has been criticized for the rigidness since it concentrates only on four perspectives, thus some key success factors may be unnoticed (Andriessen, 2004). Further, the model only takes care of some stakeholders such as consumers and shareholders, while excluding employees, providers, associates and the community (Roos et al., 2005).

The Sveiby's *"Intangible Asset Monitor"* also belongs to the group of SC methods. The conceptual framework of the model comprises of three-by-three matrix (An, 2015). In this matrix the first "three" refers to the three components of the intellectual capital: the external structure, the internal structure and competence, while the second "three" refers to three groups of indicators for each intellectual capital component: indicators of growth/renewal, indicators of efficiency and indicators of stability (Sveiby, 1997, p. 78). The indicators are selected based on the firm's strategy and for each intangible asset only a limited number of the measurement indicators should be included "with the most important areas needing to be covered those of growth and renewal, efficiency and stability" (Bontis, 2001, p. 52). It is very simple to use.

4.5. Proper Measurement Systems

MS methods take everything of value inside or outside the company and break them down into measurable attributes which are then organized into a measurement system, valued by using the real data and combined with financial data to deliver value for money and related outputs (Pike & Roos, 2004). This approach aims at all-inclusiveness and consistency with a clear handling of all aspects of intangible value, and hence if done properly offers the possibility of reliable measurement as well as an adequate combination of intellectual capital resources and financial resources (Roos et al., 2005). The representative model in this group is the *"Holistic Value Approach"* developed by Pike and Roos (2000).

The HVA is the third generation of the intellectual capital practice (Chatzkel, 2002), that resolves the difficulty of creating one overall measure from numerous measures of different units. Opposite to other intellectual capital models in which the combination of diverse

measures did not fulfil the obligatory requirements and validity conditions as defined by measurement theory, the HVA does satisfy these requirements, since it merges the elements of the Intellectual Capital Index^{TM} developed by Roos et al. (1997) and the Inclusive Value Methodology^{TM} developed by M'Pherson and Pike (2001). This model makes a difference between the value created within the organisation, and the value created externally with various sources this value comes from (Pike & Roos, 2000). These internal and external, financial and non-financial values, are grouped "within the definition of Inclusive Value" (Viedma Marti & Cabrita, 2012, p. 154). Value is generated through the various value creation paths which represent the business model of a company (Chatzkel, 2002). These value creation paths are displayed in one picture – "navigator that visualizes how value is really created in the organization" (Viedma Marti & Cabrita, 2012, p. 154).

The starting point in the model is to identify the key stakeholders and outline the strategic objectives of the organization, its activities and values. This model starts with the premise that value is subjective, i.e. "value, like beauty, is in the eye of the beholder" (Chatzkel, 2002, p. 115), meaning that the same indicator can have different value through the lens of different observers/stakeholders. However, the axiology states that "value is measurable if the preferences of the beholder are well defined" (Andriessen, 2004, p. 301), that is, if the hierarchy of value exists for each stakeholder involved in value measurement (Pike et al., 2002). The HVA is based on the assumption that all stakeholders will generally have a similar set of objectives, however the hierarchy of the objectives will be different among them due to the relative importance of each objective (Pike & Roos, 2000). Therefore, each objective will be assigned appropriate weights relative to its importance to the stakeholder.

The following stage in the model refers to the translation of the objectives into measurable attributes. The described process of identification and ranking of objectives and the measurement of attributes can be accomplished only by operating personnel that perform daily business operations. The determined relations between the measurable attributes identifies the business value-creating pathways (Viedma Marti & Cabrita, 2012). In a navigator picture each main resource is denoted by a circle whose size depends on the relative importance of the key resource, while the linking arrows symbolise the change of one resource into another and the arrows' thickness reveals the importance of change (Andriessen, 2004). The result is a model of the business as a value generator (Pike & Roos, 2000).

The HVA model is a very useful tool for making trade-off decisions, especially in circumstances where the interests of several stakeholders have to be addressed and thus could play a significant role in the straightforward communication with particular stakeholder groups (Andriessen, 2004). However, from the above described process it is evident that this method is somewhat complex to implement without the expert support.

CONCLUSION

The trends of globalization, deregulation and remarkable technological developments, especially concerning the information and communication technologies, have formed a new era that has redesigned the global socioeconomic settings. The rapid development of information and communication technologies brings substantial benefits which are used to intensify the dynamics of economic development of countries and regions, thus leading to the effective transformation of knowledge, skills, talents and know-how of individuals in profit and non-profit organisations and enterprises. These processes are altering the

competitive market structure. In this new conditions, the knowledge has become the crucial production factor, and driver of the firm's value creation, sustainable competitive advantage and national prosperity. The long-term economic growth and development are at the same time driven and constrained by the knowledge creation, dissemination and use.

The importance of intellectual resources in the knowledge-based economy has given rise to the development of numerous measurement methods with the aim to satisfy the requirements of various stakeholders and to enable the management of these invisible resources. One of the reasons for measuring and reporting on intangibles is the changed structure of resources in the modern knowledge enterprises from tangible resources toward intangible intellectual resources. Managers, shareholders and other stakeholders acknowledge the importance of proper measurement and reporting of these valuable resources. Additionally, these knowledge enterprises have appreciated that the proper management, especially of non-financial performances of intellectual capital, can enhance the strategic decision making processes in the organization, enable better determination of the compensation benefits for workers, and improve the communication of firm's performances to the external stakeholders.

However, in order to properly manage intangibles, it is necessary to develop and implement a sound measurement methodology that will address the requirements of all interested parties. Hence, the most significant methods for the intellectual capital measurement at microeconomic level have been elaborated in this paper, since the list of the measurement methodologies is non-exhaustive. The authors have highlighted the advantages and disadvantages of the given models, so that the managers can choose the appropriate model for their organization, based on the outcomes they want to achieve. Certainly, the most comprehensive measurement system is the holistic value approach which captures the financial and non-financial value of intellectual capital.

From all the above mentioned, it is clear that intellectual capital is the most important driver for creating value and competitive advantage, and therefore its significance must be communicated to all stakeholders through a sound measurement system.

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MIKROEKONOMSKE PERSPEKTIVE MERENJA
INTELEKTUALNOG KAPITALA

Intelektualni kapital je izuzetno proučavan koncept među istraživačima u ekonomiji znanja. Ovo iz razloga što su intelektualni resursi ključni pokretači rasta i konkurentnosti u globalizovanom okruženju. Međutim, merenje intelektualnog kapitala, kao nematerijalnog resursa, nije jednostavan zadatak. Istraživači već nekoliko decenija pokušavaju da postave sistem merenja koji će omogućiti korisne upravljačke informacije menadžerima. Postoje brojne metodologije merenja, ali lista nije konačna. Adekvatna upotreba metodologija merenja intelektualnog kapitala omogućava adekvatno upravljanje intelektualnim kapitalom i time vodi do stvaranja konkurentske prednosti i uvećanja vrednosti za preduzeća i bogatstva nacije. Zbog toga, cilj rada je da analizira različite mikroekonomske metodologije merenja intelektualnog kapitala koje se fokusiraju na nivo organizacije. Autori kritički analiziraju brojne zapažene metode vrednovanja intelektualnog kapitala, kao i indikatore koji se koriste kako bi se obuhvatile performanse intelektualnog kapitala, doprinoseći time unapređenju procesa upravljanja nevidljivim, vrednim nematerijalnim resursima u cilju stvaranja vrednosti za različite stejkholdere i unapređenja konkurentnosti preduzeća.

Ključne reči: *intelektualni kapital, nematerijalna aktiva, znanje, ekonomija znanja, metodologije merenja, konkurentnost*