ABSTRACT: Measuring intellectual capital contributes to organisational success and brings managerial, cultural and organisational changes. In analysing the relevant literature on intellectual capital (IC), it emerges that the benefits of IC measuring and reporting have been linked to value creation. In order to provide a deeper understanding of the character and role of IC and adequate IC indicators, the main aim of this study is to propose a strategic model for measuring intellectual capital in Serbian industrial enterprises.

The research findings revealed a lack of both employee innovativeness and permanent competence development of top managers and employees, which may be a significant problem in the potential growth of Serbian industry. The factor analysis showed that the proposed questionnaire (based on relevant scorecard methods) is adequate for investigating the phenomena of intellectual capital in industrial enterprises in Serbia.

KEY WORDS: measuring intellectual capital, strategy, industry, innovations

JEL CLASSIFICATION: L60, M21
1. INTRODUCTION

Many authors have argued that IC has become one of the primary sources of the competitive advantage of an enterprise (Edvinsson and Malone, 1997; Stewart, 1997; Sveiby, 1997a; Bontis, 2001; Kaplan and Norton, 2004). IC can be defined in terms of organisational resources, relating to wealth creation through investment in knowledge, information, intellectual property, and experience (Kong, 2007:725).

Enterprise’s intellectual capital is all capital that exists within the boundaries of the organisation, including relations with the external environment. Ideas, skills, and creative potential are the essence of intellectual capital (Webster and Jensen, 2006:82). There is a significant difference between intellectual capital, such as corporate culture, corporate know-how, employees’ competence (knowledge and skills), employees’ satisfaction, customer loyalty and training costs, and intangible assets, which include projects, software, data bases and intellectual property, including copyrights, franchises, patents and brand names (Fincham and Roslender, 2003, Blair and Wallman, 2001).

In the past five years, various methodologies and tools have been provided to help enterprises identify and assess their intellectual capital (Marr and Schiuma, 2001; Roos et al., 1997; Sveiby, 1997). Despite the wide acknowledgement of knowledge as a strategic resource, it is still not well understood how intellectual capital influences business performance.

Measuring intellectual capital is a complex problem. With regard to its properties, IC completely differs from its tangible counterparts. As a result, the traditional financial and managerial accounting instruments are not able to capture IC value, which leads to poor valuation (external communication problem) on the one hand, and poor usage (internal management problem) on the other. By having both accounting’s backward report on recent results and IC measurement’s forward view of what might be coming, management has a better sense of what to do next to develop or maintain a competitive advantage (Finz-Enz, 2000:148).

There are various reasons why top managers need to measure intellectual capital. In reviewing relevant literature on IC, it emerges that the benefits of IC measuring and reporting are linked to the design and implementation process, which leads to the creation of new intellectual capital (Chiucchi, 2008:217). One study identified five main reasons (Marr et al., 2003). The following four reasons are internal to the organisation. First, measuring intellectual capital can help top managers to formulate business strategy. Second, good metrics facilitate implementation of
strategy (Allio, 2005:255). Intellectual capital has little value unless it can be linked to the organisation’s strategy (Edvinsson and Malone, 1997). Third, measuring intellectual capital can assist in evaluating mergers and acquisitions. Fourth, using non-financial measures of intellectual capital can be linked to an organisation’s incentive and compensation plan. The fifth reason is external: to communicate to external stakeholders what intellectual property the enterprise owns (Holmen, 2005).

Perhaps the best reason to measure intellectual capital is to consider the risks of not measuring it, such as unpredicted labour shortages, skills mismatches that choke off growth, talent fleeing to competitors, and productivity levels that realise only 70 percent of their full potential (Schiemann, 2008). Adequate IC indicators may provide key information about emerging trends, such as declining talent availability, higher turnover of strong performers, unionization vulnerability, and emerging ethics risks. Instituting these measures may be a competitive advantage to enterprises in a world of increasing competition and scarce resources.

Measuring intellectual capital brings managerial, cultural and organisational changes. As a process, it permits planning and managing intangible resources consistent with the enterprise strategy for creating value. Therefore, the most important benefit obtained from measuring intellectual capital is the spread of the “intellectual capital culture” within an organisation (Chiucchi, 2008:229).

There is increasing interest in the academic community and from researchers in IC measuring and reporting that is rooted in business evaluation and planning activities. Over the last decade there has been a minor explosion in the IC metrics industry. One recent study categorized 12 different approaches to measuring intellectual capital, and others identified more than 30 (Pike and Roos, 2004; Andriessen, 2004a; Andriessen, 2004b).

The main purpose of this study is to identify specific characteristics of intellectual capital in order to define a group of relevant indicators that will be included in a proposed model for measuring intellectual capital in Serbian industry. We also have analysed intellectual capital and its influence on the performance of selected industry enterprises.

Even though there are numerous methods for IC measuring, this research provides an insight into the specific features of IC and enables the fine-tuning of the existing methods. As a basis for the research questionnaire we used IC concepts such as the Intangible Assets Monitor, Danish Guidelines, and Meritum Guidelines. In
the relevant literature there is no standard measuring concept, and a combination of the aforementioned concepts is rarely used.

This study presents preliminary diagnostics of IC in Serbian industrial enterprises and points to important problems in the observed enterprises (competence development, innovation, leadership) and possible strategies, presented in a strategy map.

In general, the contribution of this research should be viewed as a refinement of the existing IC reporting methods with respect to the unique characteristics of the environment and industry. The suggested indicators can be useful for managers as a basis of IC reporting in Serbian industry.

This study sets out to identify the strategic model for measuring intellectual capital by investigating 109 top managers in 13 industrial enterprises in Serbia. First, in order to define the main categories for empirical research, an overview of the relevant literature is presented. The paper then introduces the research methodology, presents the research findings, discusses them, and draws some conclusions and implications for primarily Serbian management in industry. Finally, the contributions and some possible directions for further research are presented.

2. THEORETICAL BACKGROUND

The origins of measuring intellectual capital lie in the pioneering work pursued at the Swedish insurance giant, Skandia (Edvinsson, 1997; Edvinsson and Malone, 1997). Two key contributions to the conceptual framework were the value scheme and the Navigator. The value scheme identifies two main forms that intellectual capital takes: 1. human capital, and 2. structural capital, which consists of organisational capital and relational capital.

There are strong similarities between the Skandia Navigator and the Balanced Scorecard, developed in the US and associated with Kaplan and Norton (1992, 1993, 1996, and 2004). In this framework, mission and strategic objectives can be translated into a set of performance measures. The aim of the Balanced Scorecard (BSC) is to give managers a comprehensive view of the business and allow them to focus on critical areas.
The concept of the BSC is based on the assumption that the efficient use of investment capital is no longer the key determinant of competitive advantage, and that soft factors such as intellectual capital and knowledge creation are increasingly becoming more important. The BSC balances the financial perspective with the following three non-financial perspectives: customer perspective, internal business process, and the learning and growth perspective. The BSC's four perspectives can be characterized briefly as follows:

- **The financial perspective** indicates whether the transformation of a strategy leads to improved economic success. The two roles of financial measures are: 1) to define the financial performance a strategy is expected to achieve, and 2) to be the endpoint of cause and effect relationships referring to the other BSC perspectives.
- **The customer perspective** defines the customer/market segments in which the business competes.
- **The internal process perspective** identifies those internal business processes that enable the enterprise to achieve superior value for the customers and shareholders.
- **The learning and growth perspective** provides the infrastructures (e.g. skilled and creative employees) for the realisation of the aims of the other three perspectives.

The learning and growth perspective is the basis of an enterprise's ability to generate value and underlies internal business processes, which, in turn, affect customer satisfaction and consequently financial results (Kaplan and Norton, 1996). Any business strategy needs to address each of the four perspectives. Specific objectives and critical success factors can then be developed for each perspective. These critical success factors can then be measured using key performance indicators and initiatives linked to strategic objectives in each perspective. The BSC is directed top down, both in its contents and in its development as a management system.

Kaplan and Norton (1996) distinguish between *lagging* and *leading indicators*. *Lagging indicators* are formulated for the strategic core issues of each perspective derived from the strategy, and they indicate whether the strategic objectives in each perspective have been achieved. In contrast to the lagging indicators, the *leading indicators* express the specific competitive advantages of the enterprise and represent how the results should be achieved. The integration of the indicators in the four perspectives is achieved by defining goals and appropriate lagging and leading indicators (Kaplan and Norton, 1996) for a specific business strategy.
The Balance Scorecard, therefore, leads an organisation to identify links and trade-offs between different factors that affect business performance. According to the latest developments in the Balanced Scorecard, any achievement of the strategic goals develops through causal links between the four perspectives, which can be drawn in causal maps, which assure consistency between operating decisions and business strategy. The Balance Scorecard proposes the learning and growth perspective as the fundamental dimension to evaluate and manage intellectual capital. The competitive success of an enterprise is interpreted as a cause-effect chain, which can be drawn in a strategy map.

The third approach, which can be viewed as the first generation of measuring intellectual capital, is the Intangible Assets Monitor developed by Sveiby (1997a, 1997b). The intangible part of the balance sheet can be classified as a family of three: 1. Individual competence is people’s capacity to act in various situations and includes skill, education, experience, values, and social skills, 2. Internal structure consists of a wide range of patents, concepts, models, and computer and administrative systems, and 3. External structure consists of relationships with customers and suppliers, brand names, trademarks and reputation, or image.

**Table 1. Three IC conceptual frameworks**

<table>
<thead>
<tr>
<th>Sveiby</th>
<th>Kaplan and Norton</th>
<th>Edvinsson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Structure</td>
<td>Internal Processes Perspective</td>
<td>Organisational Capital</td>
</tr>
<tr>
<td>External Structure</td>
<td>Customers Perspective</td>
<td>Customer Capital</td>
</tr>
<tr>
<td>Competence of Personnel</td>
<td>Learning &amp; Growth Perspective</td>
<td>Human Capital</td>
</tr>
</tbody>
</table>

Source: Sveiby (1998)

A generic format for intellectual capital statements emerged from research funded by the Danish Agency for Trade and Industry (Mouritsen, 1998; DATI, 1999; DATI, 2000; Mouritsen et al., 2001a; Mouritsen et al., 2001b). Danish Guidelines provide “a status of the company’s efforts to develop its knowledge resources through knowledge management; and does so in ‘text, figures and illustrations” (DATI, 2000:14). Intellectual capital statements have three elements: a knowledge narrative, management challenges, and reporting. The knowledge narrative sets out how the business ensures that its products or services meet customers’ requirements, as well as how resources will be organized to accomplish this. The management challenges are those faced by the business in implementing
its knowledge narrative. Actions associated with management challenges are documented, as are relevant performance indicators. The reporting element can be either internally or externally oriented.

The format put forward by the Meritum Guidelines (Meritum, 2002) is similarly composed of three elements: a vision of the firm, a summary of intangible resources and activities, and a system of indicators. The vision, like the knowledge narrative, communicates the business's objectives and strategies as well as documenting critical intangibles or drivers of value creation. The summary describes the stock of intangibles available to the business and the activities in place to enhance these. The system of indicators communicates the success of the business in managing its stock of intangibles. It is necessary for management to identify the most relevant combination of indicators for their own business (Fincham and Roslender, 2003).

What all these conceptual frameworks have in common is that they make a distinction between three types of intellectual capital, referred to as human capital, structural capital, and relational capital (Bontis, 1998, 2002; Meritum, 2002; Roos, 2004; Marr, 2004; Tovstiga and Tulugurova, 2007). “It has become standard to say that a company’s intellectual capital is the sum of its human capital (talent), structural capital (intellectual property, methodologies, software, documents, and other knowledge artefacts), and customer capital (client relationships)” (Stewart, 2001:13). Nowadays, the majority of models are based on this “taxonomy of three”, or a further subdivision. The reasoning for this subdivision is that the concept of intellectual capital is too broad, and therefore needs further specification. The subdivision provides a useful framework for arranging the indicators. For the purpose of our empirical research, we follow the well-accepted subdivision of IC.

**Human capital** (HC) represents anything related to the people within the organisation, including knowledge, attitudes, competencies, experience, skills, tacit knowledge, creativity, problem solving capacity, and the innovativeness and talents of people (Guerrero, 2003; Tovstiga and Tulugurova, 2007). HC is important to organisations as a source of innovation and strategic renewal (Bontis, 2002; Bontis et al., 2000; Webster, 2000). Three attributes of human capital, competence (knowledge, skill sets, and experiential knowledge), attitude (level of motivation, behavioural patterns), and employees’ intellectual agility (innovation, creativity, flexibility, adaptability) exhibit a high degree of tacitness. The organisation does not own this capital. According to Baron (2007:71), human capital strategy consists of six interconnected factors:
1. people (their skills and competencies in hiring, training and experience, their qualification level, and the extent to which they generalize human capital);
2. work processes (how work gets done, the degree of teamwork, and the role of technology);
3. managerial structure (management direction and control, spans of control, performance management and work procedures);
4. information and knowledge (how information and knowledge are shared and exchanged among employees);
5. decision making (the degree of decentralization, participation and timeliness of decisions), and
6. rewards (how monetary and non-monetary incentives are used, individual versus group rewards; current versus longer-term “career rewards”).

By contrast, **structural capital** (SC) is owned by the enterprise and includes the structures, systems and processes that the organisation uses to support its operations, as well as brands, image, culture, prototypes, documented information and intellectual property. SC becomes the supportive infrastructure for HC. It includes all of the non-human storehouses of knowledge in organisations – such as databases, strategies, routines, organisational culture, publications and intellectual property (e.g. patents, copyrights, trademarks, brands, registered design, trade secrets and processes whose ownership is granted to the enterprise by law (Ordóñez de Pablos, 2004).

**Relational capital** (RC) characterizes all forms of formal and informal relations with its stakeholders (Bontis, 1998; Fletcher et al., 2003; Grasenick and Low, 2004). These relationships could be licensing agreements, partnering agreements, contracts, or distribution arrangements. They also include customer relationships such as customer loyalty and brand image. These resources are not owned by the organisation and are at least partly controlled by the external stakeholders. The value of customer capital is mainly determined by the extent to which an organisation is able to maintain confidence in its reputation.

The three IC categories are inter-dependent (Subramaniam and Youndt, 2005). Value creation is the product of interaction between the different classes of IC (Roos et al., 1997; Sanchez et al., 2000). IC renders the best possible value to organisations through the combination, utilisation, interaction, alignment, and balancing of the three IC categories as well as through the managing of the knowledge flow between them. Roos et al (1997:417-423) stated that the vehicle for measuring intellectual performance is a set of indicators used for each intellectual capital category.
3. RESEARCH METHODOLOGY

The results of one piece of research conducted in an insurance enterprise in Serbia using the application of two IC measuring methods (Intangible assets monitor and Danish Guidelines) indicated the necessity for modification of the existing IC measuring methods, particularly in the field of indicators, pertaining to characteristics of the environment, industry and the enterprise (Cabrilo, 2005). Unfortunately most Serbian industries are still using traditional financial accounting and performance measurement methods for tangible assets. Taking into account that in Serbia IC measurement has not been considered important, the data gathering systems are not customized to the known IC measuring methods. The knowledge-based environment of Serbia and other transition economies requires a new model that encompasses intellectual capital and includes the specific environment.

Compared with world trends it is possible to conclude that there is a lack of awareness of the importance and the nature of IC measuring methods and reporting in Serbia. Hence, the ability of enterprises to choose a proper method and apply it successfully in order to achieve strategic goals is diminished. This presents a new research problem: conceptualisation of a model for measuring intellectual capital in Serbian enterprises.

The research methodology was based on interviews with 109 managers holding key managerial positions in 13 industrial enterprises. In the selected sample the starting point was the structure of Serbian industry in 2006 by divisions, excluding public and failing enterprises (e.g. textile, leather, leather products, and footwear manufactures). Public enterprises were examined in this study but preliminary results indicate a need for further investigations: therefore we excluded them from this report. An additional source for the selection process was a ranking of the 300 most successful enterprises in Serbia in 2006 by operating revenues, according to the Economist Journal. Therefore the industry structure of the selected sample is:

- manufacture of food products and beverages – 4 enterprises;
- manufacture of chemicals and chemical products – 3 enterprises;
- manufacture of tobacco products – 1 enterprise;
- publishing, printing, and reproduction – 1 enterprise;
- manufacture of metal products - 1 enterprise;
- mining of metal ores - 1 enterprise;
- manufacture of office machinery and computers- 1 enterprise; and
- manufacture of rubber and plastic products - 1 enterprise.
The number of participants varied across enterprises according to the enterprise size (number of available managers) and the willingness of managers to be included in the survey. The vast majority of participants (56.07%) came from large organisations (over 250 employees), while 43.93% came from medium-sized (50-250 employees).

Personal information about top managers in the sample consisted of age structure, degree of formal education, and length of employment in the observed enterprises.

46% of top managers were aged 46-55, 26% were aged 26-35, and 24% were aged 36-45. There were no managers below the age of 26, which reflects on innovation activities in the observed industrial enterprises.

The majority of observed top managers had a faculty degree (53%), then came the managers with a high school education (25%) and college degree (17%). The percent of managers in industry with a PhD or Masters degree is considerably smaller.

The largest percent of managers had between 21-30 years of work experience (37.38%) followed by those that had 11-20 years of work experience (21.50%) and those with less than 5 years experience (16.82%). 13.09%, percent of managers in the total sample had been working longer than 31 years whereas the smallest percentage of managers - 11.21% - had 6-10 years of working experience.

Considering the education levels and work experience of over 10 years of the majority of managers it can be assumed that they knew the resources, factors that influence business results, and the success of their organisations.

The survey was conducted directly, i.e. the participants were aware they were participating in a survey, but the questions were not known ahead of time. This was important to avoid any behavioural bias in the responses. The majority of the “survey insiders” used their business contacts successfully. The response rate was outstanding – 90%.

**Research design.** The research took place during September and October 2007. The survey was developed in order to identify key factors influencing IC in Serbian industrial enterprises. The questionnaire was designed based upon the scorecard measuring method and embodying Sveiby’s Intangible Assets Monitor, Danish Guidelines, and Meritum Guidelines. Within the group of influencing
factors of IC (human, structural and relational) suggested in the initial methods. 32 influencing factors were chosen: 12 of human capital, 10 of structural capital, and 10 of relational capital. Each of the aforementioned influencing factors was determined by a group of questions. Moreover, questions were clustered around three primary IC categories and the influencing factors they comprise.

Considering the general lack of survey participants in Serbia, the following steps were undertaken to encourage participation:

- the questionnaire provided a degree of anonymity (i.e., it did not include financial information pertaining to the enterprise or personal information about the participants),
- two versions of the questionnaire were offered - electronic and hard-copy – for the convenience of participants,
- the research team compiled a list of enterprises in Serbia where the team members had business contacts or friends in managerial positions (“survey insiders”),
- the selected enterprises were diverse with regard to ownership structure, number of employees and geographic location.

**Data analysis.** Analysis of answer frequency, Pareto analysis of cumulative frequencies and analysis of percentage of occurrence of certain answers were used. Factors were extracted according to Kaiser Criteria. After extracting the factors, orthogonal analytic rotation (varimax criteria) was applied. Pareto analysis was used to determine the impact level of particular HC influencing factors on goal achievement and business success. Measures of suggested factors’ importance in Serbian industrial enterprises were identified based on their impact level.

4. **RESEARCH FINDINGS AND DISCUSSION**

The results of factor analysis showed that the questionnaire is adequate for investigating phenomena of intellectual capital in industrial enterprises (Cronbach’s alpha is 0.7542). The answers to the proposed questionnaire can explain dominant characteristics of intellectual capital in industry. In addition, it is possible to identify indicators of intellectual capital in Serbian industry. The results of empirical research have been presented according to the aforementioned groups of intellectual capital (see Table 2).
Table 2. Summary of survey results

<table>
<thead>
<tr>
<th>IC category</th>
<th>Examined factor</th>
<th>Cumulative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human capital</td>
<td>Desirable characteristics of their employees</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experience</td>
<td>88.8</td>
</tr>
<tr>
<td></td>
<td>Cooperativeness</td>
<td>67.3</td>
</tr>
<tr>
<td></td>
<td>Dedication and efficiency</td>
<td>65.4</td>
</tr>
<tr>
<td></td>
<td>Innovation attitude</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knowledge codification</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Procedures for implementation</td>
<td>38.7</td>
</tr>
<tr>
<td></td>
<td>Stand unused</td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>Key influencing factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employees’ efficiency</td>
<td>91.5</td>
</tr>
<tr>
<td></td>
<td>Employees’ experience</td>
<td>84.9</td>
</tr>
<tr>
<td></td>
<td>Employees’ motivation</td>
<td>79.2</td>
</tr>
<tr>
<td>Structural capital</td>
<td>Top managers’ competence development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>within last six months</td>
<td>36.0</td>
</tr>
<tr>
<td></td>
<td>more than a year ago</td>
<td>33.0</td>
</tr>
<tr>
<td></td>
<td>never</td>
<td>23.0</td>
</tr>
<tr>
<td></td>
<td>Employees’ databases</td>
<td></td>
</tr>
<tr>
<td></td>
<td>personal information</td>
<td>93.0</td>
</tr>
<tr>
<td></td>
<td>information on service length</td>
<td>90.0</td>
</tr>
<tr>
<td></td>
<td>information on formal education</td>
<td>89.0</td>
</tr>
<tr>
<td></td>
<td>Key influencing factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>employees’ communication and interaction</td>
<td>64.0</td>
</tr>
<tr>
<td></td>
<td>managerial processes</td>
<td>63.0</td>
</tr>
<tr>
<td>Relational capital</td>
<td>Important stakeholders</td>
<td></td>
</tr>
<tr>
<td></td>
<td>business partners</td>
<td>88.0</td>
</tr>
<tr>
<td></td>
<td>banks</td>
<td>41.0</td>
</tr>
<tr>
<td></td>
<td>state administration</td>
<td>36.0</td>
</tr>
<tr>
<td></td>
<td>Sources of knowledge acquisition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>co-operation with customers</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>employing individuals with proper competence</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>training and education</td>
<td>43.0</td>
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<tr>
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<td></td>
<td>customer relationship</td>
<td>90.0</td>
</tr>
<tr>
<td></td>
<td>supplier relationship</td>
<td>84.0</td>
</tr>
<tr>
<td></td>
<td>perceived image</td>
<td>56.0</td>
</tr>
</tbody>
</table>
4.1. Human capital

Human capital analysis consisted of two parts, firstly, investigation of managerial attitudes towards employees’ desirable characteristics, employees’ motivation and innovativeness, and secondly, identification of influencing factors on enterprise performance.

Analysis of top managers’ attitudes towards desirable characteristics in their employees gave the following results: experience, cooperativeness, dedication and efficiency, expertise, education, initiatives, loyalty, permanent learning, and innovativeness.

Human capital results mainly focused on responsibility and employee experience (employees having a good knowledge of their jobs, processes, procedures, and markets). These characteristics were more important than expert knowledge and social skills (empathy, interactions with others). It is evident that the source of human capital was considered to be employees’ experience. Creativity and innovativeness were ranked low by the top managers observed.

Analysis of motivational factors showed that the selected top managers thought that employees are motivated exclusively by money (87.9%). Career movement (5.6%), and quality of work (4.7%) had a low impact. Non-financial motivation was insignificant at 0.9%. This conclusion goes in line with the theory that money has significant impacts on employees’ motivation and their work-related behaviour in companies (Opsahl and Dunnette, 1966; Whyte, 1955). To Lawler (1981) money is a motivator. Results of an empirical study conducted with 1,000 employees showed that younger employees with low incomes in non-managerial positions were most concerned with money (Kovach, 1987). However, the available research (e.g. Yamauchi and Templer, 1982; Wernimont and Fitzpatrick, 1972) has very limited application to the field of organisational behaviour (Tang, 1992:197).

This study also embodied the innovation value chain. The innovation value chain consists of three main links: source of knowledge, knowledge transformation into innovation, and exploration of innovation (Kontić, 2008:25). The attitude towards innovation of observed top managers in industrial enterprises showed that in most cases innovations were implemented according to procedures for process innovation. 24.5% of selected industrial enterprises did not have procedures for inducing process innovations.
The process of transforming knowledge into innovation was evident in the selected industrial enterprises, which represents a high percentage of codification. Only one industrial enterprise legally patented their innovations. More than a quarter of innovations remained unused.

In some of the selected industrial enterprises employees were not willing to share or were afraid to expose their ideas, which indicates a lack of trust in the organisational culture.

In the observed enterprises there was a problem with sharing knowledge, which prevents development of employee competence. Top managers should conduct activities aimed to transfer key competences though sharing knowledge (mentor work) or codification of key competences (notification, knowledge basis etc).

The participants in the survey were asked to choose, without ranking, the 5 out of 9 offered factors of human capital which have the greatest impact on enterprise performance. By distinguishing influencing factors with the greatest influence (the “Pareto rule”), the following key influencing factors of human capital were determined: efficiency, experience and motivation.

The fact that employee efficiency was seen as the primary key influencing factor of human capital was unexpected, since it is opposed to the previous examination of the managers’ attitudes towards the desirable characteristics of their employees. Upon further examination, when we organised the presentation of results, we reached a conclusion as to what participating top managers meant by efficiency and why they thought that it determined business performance: efficiency implies resources should be deployed and utilised to maximise returns, and in the industrial era this is related to employees. The quantitative measure of employee's efficiency is output (in units) per employee.

Efficiency being at the top of the list, innovativeness in the next to last position, and education of employees fifth, reflect the existence of the industrial rather than the knowledge era in Serbia. More importantly, the management excessively pointed out employee efficiency, and this may indicate that the management tends to transfer responsibility to all individuals in the enterprise.

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1 Innovation codification process comprises implementation according to defined procedures, writing down the ideas and their patenting.
The ranking of employee experience in the group of key influencing factors was expected, even though experience was not listed in the group of characteristics most appreciated by top managers. The fact that motivation was listed in the group of key influencing factors of human capital indirectly reflects the managerial awareness of its importance, which is rather encouraging. Motivation is perceived as a powerful means of building relationships within the organisation and more efficient goal achievement.

On the other hand, the selected top managers in Serbia found education and knowledge-sharing to have a relatively small impact on business performance.

In the observed enterprises, lack of employee innovativeness indicated a lack of managerial initiatives aimed at encouraging creativity (motivation, competent development, reward), which results in insufficient product and process innovation.

Top managers preferred experience (number of years spent in the enterprises) to expert knowledge. This result has the positive connotation that organisational competences were not based on a few key experts (little instability on the part of human capital). But there is the problem that management needs to base more on competences development and employees’ innovativeness: an enterprise’s investment in all forms of employee development is an effective predictor of future human capital capability (Fitz-Enz, 2000:155).

4.2. Structural capital

The structural capital analysis consisted of two parts: collecting data about top managers’ competence development and databases in the selected industrial enterprises. The second part consisted of identifying influencing factors on enterprise performance.

The analysis of managers’ competence development revealed that more than half of the managers in the Serbian industrial enterprises developed their competences insufficiently, neglecting training and education. In order to keep up with turbulent changes in the environment and to overcome new challenges, we have to accomplish obligatory pre-condition factors: managing competences and leadership. The reasons for the lack of competitiveness in the observed enterprises and Serbian industry as a whole are examined in the obtained results.
If we consider the hypotheses that state that formal education is not a comprehensive and accurate measure of employees’ knowledge and skills, and that service length is not a comprehensive and precise measure of experience, the following question arises: what data about their employees do industrial enterprises in Serbia document? This can help to learn whether and to what extent these companies create knowledge bases. Knowledge bases can largely contribute to better organisation of human resources, in which each employee contributes to value creation to the highest degree. Additionally the knowledge base helps an enterprise to discover “what it knows” and contributes to the knowledge sharing process.

Employee databases in Serbian industrial enterprises mainly contain personal information and information on service length and formal education, whereas information on employee knowledge and skills as well as their actual experience is less documented. Based on these results, it is possible to conclude that the observed Serbian enterprises are still not sufficiently focused on identification of valuable knowledge, skills and experience: factors remarkably important in the value-creation process, their codification, and knowledge-base creation.

Participants were asked to chose the 4 out of 10 offered influencing factors of structural capital (without ranking), which were, in their opinion, primary key influencing factors on business performance. The following influencing factors were emphasized as the key ones: employees’ communication and interaction, and managerial processes. Further analysis of the manner of employees’ cooperation, indicated that employee interactions are based on direct verbal communication rather than technology.

Neither factors related to innovation (product innovation development, process innovation) nor R&D were seen as critical influencing factors. We came to the conclusion that innovations and research and development are again neglected, which is in line with the previous results of ranking key influencing factors of human capital, in which innovation and competence development were omitted. These findings reveal obvious deficiencies in innovation in Serbian industrial enterprises. This could be the result of poor employee innovativeness, lack of managing initiatives aimed to encourage innovation, or insufficient implementation of innovations.

Simplicity of procedures is an important element in process efficiency and enterprises’ competitiveness. Information-communication technology is an important element of structural capital and supports the knowledge-sharing
process. This indicates that the problem is in human capital because employees are not willing to share knowledge.

Technological opportunities for knowledge transfer and acquisition were ranked low in the observed enterprises, which implies an obsolete technology.

Organisational culture had the lowest rank. There is a lack of trust in organisational culture in the observed enterprises which implies low employee satisfaction. Employees are not committed to their tasks. They do jobs without energy, which implies a motivation problem.

4.3. Relational capital

The analysis of relational capital factors was also conducted in two phases. First the selected top managers exposed their opinions about partnerships with external stakeholders, especially customers, and external sources of knowledge. In phase two, key factors of relational capital affecting performance were identified.

The process of identifying key external stakeholders is very important during the analysis of relational capital. The selected top managers in Serbian industrial enterprises ranked 10 offered stakeholders (customers were not included, since these relations were examined separately within other items) (see table 2).

Key stakeholders for the selected top managers in industrial enterprises in Serbia were business partners, banks, and state administration. This is to be expected, as business partners are relevant to business success, banks have financial resources, and the state administration determines import and export quotes, custom rates, legal roles etc.

The selected industrial enterprises rarely cooperated with local administration, shareholders, and research institutes. The main reason for undeveloped cooperation with shareholders is the relatively recent privatization of the selected enterprises.

The rarity of cooperation with research institutes and universities reveals that industrial enterprises are not oriented to product innovation or have internal R&D activities. Undeveloped relationships with shareholders and R&D institutions also evidence that the observed enterprises’ primary financing is through bank credits.

According to top managers from the observed enterprises, key sources of competitiveness (most appreciated by users/consumers) are:
1. the quality of products and 
2. long tradition.

Relational capital is based on customer loyalty. Customer relationships, a part of relational capital, are unstable because there are few key customers for the enterprises’ operations. Image, innovativeness and reliability are not listed among the key sources of competitiveness. The managers did not believe that the competitiveness of their companies was based on innovation, which is completely inconsistent with the results of numerous researches that have found innovation as the key driver of corporate value and competitiveness (Aramburu et al. 2006, Castellacci 2008, Cefis and Marsilli 2005, Danneels 2002). Top managers’ attitude to innovations and innovation management is one of the reasons why there is a low level of industrial growth in Serbia, and a low level of competition in industry.

Top managers are aware of current and missing knowledge that is important to generate new knowledge and knowledge implementation in the value adding process.

In Serbia, industrial enterprises acquire the deficient knowledge mostly by cooperation with customers, employing individuals with proper competence, training and education and benchmarking. Less common ways are cooperation with scientific research institutes as well as universities. Universities not only develop academic excellence in disciplines with direct research applications to industry, but also set out explicitly to develop linkages with industry for the purposes of economic development. In the UK an alliance between Cambridge University and the Massachusetts Institute of Technology (MIT) – the Cambridge-MIT Institute (CMI) – is a joint government and industry-funded initiative, intended to improve productivity, competitiveness and entrepreneurialism through the design and testing of innovative mechanisms that promote university – industry knowledge exchange.

The second part of the analysis consisted of selecting 4 out of 10 offered influencing factors of relational capital. Cumulative frequencies determined the ranking of relational capital influencing factors.

**Key influencing factors of relational capital in the Serbian industrial enterprises were customer relationship and supplier relationship.** The most significant influencing factor was the customer relationship, which was expected, as well as supplier relationship. Observed top managers had not developed relationships with shareholders partly because these enterprises were recently privatized.
It is surprising that the observed top managers did not recognize the important role of media in sustaining a positive image, nor of socially responsible activities in local communities. The lowest ranked was the relationship with the local administration, which is consistent with the managers’ ranking of external stakeholders in phase 1.

5. A STRATEGIC MODEL FOR IC MEASURING

Basic assumptions stated that dominant characteristics and key influencing factors of IC largely select the group of relevant IC indicators. By combining the significance of certain IC factors (measures of IC factors’ influence defined by Pareto analysis) and dominant IC characteristics (quantity indices of IC factors, identified by factor analysis), the group of relevant IC indicators for Serbian industrial enterprises was defined (presented in Table 3). The importance of IC factors, suggested in relevant scorecard measuring methods used in this study, was certainly acknowledged. Key influencing IC factors in Serbian industrial enterprises were dominant in defining the group of relevant IC indicators. For each key influencing factor of IC there are many indicators by which it can be appropriately highlighted and measured. However, since the number of relevant indicators measuring a particular IC factor should be reduced to 3-5 indicators, specific features of IC in the observed enterprises affected the choice of the final group of relevant IC indicators. In addition, indicators in the intellectual capital statement consist of three parts: statistical information, internal key factors, and effect measure. For each key IC factor, we proposed three indicators relevant to the concept IC statement. For example, employees’ efficiency was represented by the number of employees rewarded for outstanding results (statistical information), percentage of employees who realized goals before deadline (internal key factor), and value added per employee (effect measure). In this way a group of relevant IC indicators for observed industrial enterprises in Serbia was defined (see Table 3).
### Table 3. Model for IC measuring in Serbian industrial enterprises

<table>
<thead>
<tr>
<th>IC category</th>
<th>Key IC factor</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human capital</td>
<td>Employees’ efficiency</td>
<td>Value added per employee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percent of employees who realize goals before deadline</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of employees rewarded for outstanding results</td>
</tr>
<tr>
<td></td>
<td>Employees’ experience</td>
<td>Average seniority of employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Growth in professional experience</td>
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<tr>
<td></td>
<td></td>
<td>Rookie ratio</td>
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<tr>
<td></td>
<td>Employees’ motivation</td>
<td>Employee satisfaction index (survey)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average number of absence days per employee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Staff turnover</td>
</tr>
<tr>
<td>Structural capital</td>
<td>Employees’ communication and interaction</td>
<td>Interdisciplinary projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experience exchange meetings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of meetings with the aim of knowledge transfer</td>
</tr>
<tr>
<td></td>
<td>Managerial processes</td>
<td>Average age of managers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality of managing activities (employees’ survey)</td>
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<tr>
<td></td>
<td></td>
<td>Education days per manager</td>
</tr>
<tr>
<td></td>
<td>Organisational processes</td>
<td>Internal knowledge and information sharing</td>
</tr>
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<td></td>
<td></td>
<td>Shared knowledge documents on the intranet</td>
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<tr>
<td></td>
<td></td>
<td>Product innovation rate</td>
</tr>
<tr>
<td>Relational capital</td>
<td>Customer relationship</td>
<td>Customer structure (proportion of new, permanent and lost customers)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer satisfaction index</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percent of total revenues of 5 largest customers</td>
</tr>
<tr>
<td></td>
<td>Suppliers’ relationship</td>
<td>Percent of suppliers enhancing product quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proportion of turnover with 5 largest suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplier quality index (1-5 scale)</td>
</tr>
<tr>
<td></td>
<td>Co-operation with scientific research institutes and universities</td>
<td>Amount of assets for applied research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numbers of relationships</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percentage of students mentioning the enterprise as an ideal future employer</td>
</tr>
</tbody>
</table>
These indicators suggest that many types of metrics are possible and may vary across enterprises. There is no unique model for measuring IC, and the proposed table does not provide a bottom-line indicator of the value of intellectual capital of industrial enterprises in Serbia. Indicators are not concerned merely with metrics, but always with change activities. It is also well known that there are biases in each indicator’s coverage because of type of intangible capital and type of enterprise.

Intellectual capital is a powerful source of sustaining competitive advantage. If managers learn to measure the value of IC they could more accurately measure and manage their organisation’s competitive position (Kaplan and Norton, 2004:52).

Measuring IC is not a goal in itself. The main purpose of measuring IC is to link it to value creation. It is necessary to conceptualize the strategic model that bridges a vision- and values-based strategy with the IC perspective, and one important tool is the strategy map (Rylander and Peppard, 2003:318).

Developing the strategy map was an iterative process that built on inputs from the observed top managers. 41 interviewed top managers participated in this process. The starting point was a presentation made to the top management teams, which described relevant results from the empirical study of their enterprises. The most effective feedback came during the discussions following these presentations. The top management teams then developed and refined a statement of values, which were analysed according to frequency and formulated in a strategy map for the average enterprise in the sample (see figure 1).

Most businesses will want to put the financial perspective at the top, as their ultimate objective is to satisfy shareholders by generating a decent return. The following four financial goals were most frequent: achieving revenue target, increase asset utilization, selling cost reduction, and manufacturing cost reduction.

Under relational capital, we focused on the critical importance of basing activities on a deep understanding of customer needs, based on knowledge and sharing information. According to results of empirical research, top managers thought consumers most appreciated the quality of the observed enterprises’ products. Therefore this is their first goal, followed by: adequate price, sustaining a positive image, and further development of customer relationships. This is in line with results of empirical research in domain relational capital.
Regarding structural capital, in order to compose a strategy map top managers need to create a report that contains relevant organisational characteristics (e.g. culture, leadership, teamwork, communications etc.), strategic measures similar to indicators in table 2, and target values. Participant top managers identified the following goals: optimization of supply chain process, introduction of new products, actively seeking partnership, and increased understanding of assets.
Overall assessment of human capital may embody links to operations management, customer management, innovation, and the regulatory and social dimension. In addition, we proposed that participating top managers should re-examine target values for each human capital category which managers identified as part of the impact of human capital on business performance (particularly efficiency). This suggestion is in line with relevant literature in the field of IC. Employees expect realistic rewards for their efforts: career and development opportunities. Accordingly participating top managers most frequently proposed the following goals: improving knowledge management in the organisation, developing employee and management skills, introducing reward for innovations, and developing leadership capability and organisation culture. These were identified deficits in the observed enterprises.

Intellectual capital is the foundation of every enterprise’s strategy. The measurement and management of IC play a vital role in transforming an enterprise into a strategy-focused organisation (Kaplan and Norton, 2004:63).

The main condition for sustaining competitive advantage is effective measurement of intellectual capital and management practices that affect employees’ performance.

6. CONCLUDING REMARKS

The results show that human capital is more important than the other two categories of intellectual capital. The observed top managers selected employee efficiency as the primary key influencing factor of human capital in Serbian industry. Expertise, innovativeness, education, and knowledge-sharing were not considered key. Top managers were not sufficiently aware that innovation and long-life learning are the ultimate tools for future business success. Therefore, they do not invest in professional development, which could be one of the main reasons for low competitiveness.

In addition, the results show that product/process innovation development, as well as R&D, were not seen as key influencing factors in structural capital. The key importance of innovation and management initiatives for promoting innovation was not recognized. This results not only in the low market competitiveness of Serbian industrial enterprise but of the Serbian industry as a whole.
In the observed enterprises relational capital was based on customer loyalty. Top managers were aware of current and missing knowledge that is important to generate new knowledge and knowledge implementation, but they rely on the business partner relationship. Co-operation with universities and research institutes are neglected.

The primary research objective was not to identify precise IC measures for individual enterprises, but to look at organisational IC from a broad perspective. In other words, the goal was to identify specific features and define general measures that are applicable to Serbian industry. These would in turn prescribe applications of IC reporting and management in Serbian industry and enable enterprises within this sector to compare their performance from the perspective of IC.

Identification of key influencing factors and specific features of IC was not only concentrated on defining relevant IC indicators and IC measuring, but also on strategy and decision-making, based upon identified strengths and weaknesses of IC. The process of selecting relevant IC indicators and defining the model for IC measuring in Serbian industry presents an opportunity for enterprises within this sector to assess their IC and integrate the findings into their IC strategies.

This study has several limitations and only represents a first step in understanding and measuring intellectual capital in Serbian industrial enterprises. The research sample is small for generalising results on the sector level. There are no enterprises in industry divisions such as manufacture of electrical machinery and apparatus, of motor vehicles and trailers, or of furniture and related products. Furthermore, measuring intellectual capital requires understanding key influencing factors: there was some misunderstanding about key influencing factors of human capital among the observed top managers. The implementation of the defined model (see Table 3) and the strategy map (see Figure 1) are limited to the observed 13 industrial enterprises in Serbia, as the survey participants are firm specific. The suggested group of indicators should be viewed more as a basis for a general application of IC reporting and management in Serbian industry, rather than an accurate model for IC measuring.

The results represent a basis for future research that would enable industrial enterprises in Serbia to better understand and develop intellectual capital. Future research should expand into all industrial divisions and embody a large sample. Considering the important role of industry for economic development, it is vital for leaders to reconsider the influence of intellectual capital on business performance.
and their attitudes towards IC. It is clear that training about measuring and strategic management of IC is necessary for top managers in Serbia.

REFERENCES


