European Experiences Relating to National Intellectual Capital Metrics

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Abstract At present, the intellectual capital has a prominent place in the strategy, planning and development of the territories. This role is owed to the fact that national economies are intensely prepared in a process of rapid transition towards a knowledge-based society where the intellectual capital is considered the main source of wealth, prosperity and growth. This capital can be understood from the macroeconomic point of view as representing a country or region’s ability to convert knowledge and intangible assets into wealth (economic value). Thus, the intellectual capital is closely related to the economic and human development. In terms of the components of the intellectual capital, there is not yet a common agreement on its number and scope, but all the models and methodologies developed so far indicate the presence of at least three dimensions: human capital, structural capital and relational capital.

Key words: Intellectual capital, human capital, structural capital, relational capital, sustainable development.

JEL Codes: B15, C46, M20

1. Introduction

Some of the major initiatives and studies on national intellectual capital are: the report on intellectual capital in Croatia (Croatian Chamber of Economy, 2002), various reports on intellectual capital in the Netherlands (Erz, 2002), a model of knowledge management in New Zealand (Ernst & Young, 1999), the Structural Monitoring System model in Denmark (Danish Government, 2000), the model of evaluation and measurement of the intellectual capital developed in Bosnia and Herzegovina (Basic, 2005) or the study on the efficiency of creating economic value at the European Union level (Public, 2005).

Navigator, developed by the company Skandia, was the most used model for measuring the intellectual capital of a territory. This model was used to assess the intangible wealth of Sweden, Israel, some Arab countries, Malaysia, etc. The particularity of the Navigator model is that it complements the traditional economic indicators with a range of intellectual capital indicators which allow determining the future growth potential of a territory. In this model, the intellectual capital is divided into human capital and structural capital, the latter being, in turn, divided into customer capital and organizational capital (consisting of process capital and innovation and development capital).

2. Intellectual capital in the European Union: development and ratings

The study on the intellectual capital of the European Union conducted by Andriessen and Stam (2004) set as objective to evaluate the European intellectual capital in terms of the priorities set by the Lisbon Agenda. In order to achieve this ambitious objective, the authors develop a model as specific, as it is simple – „The Monitor of the Intellectual Capital for Nations“. This model takes the taxonomy of the intellectual capital widely used internationally (human capital, structural capital and relational capital), but it includes also an additional component regarding the efficiency of the countries on long term. In the context of this model, the assets reflect a present perspective, the investments, a future one, and the effects suggest a vision of the past. Finally, for each component of the national intellectual capital is provided a set of indicators (Table 1).
measuring the intellectual capital of the European countries, according to the intellectual capital: the study, that there can be identified three groups of human capital. In respect of the relative results of surprisingly, not in the case of the investments in the structural capital (0.531), but, France, Austria, United Kingdom and Ireland) and the “leaders” group formed by the Nordic countries (the United States and Japan), it is observed another backwardness of Europe.

The same study shows, however, that there was a statistical correlation between GDP per capita and investments in the structural capital (0.531), but, surprisingly, not in the case of the investments in the human capital. In respect of the relative results of measuring the intellectual capital of the European Union member countries, it was concluded, in the same study, that there can be identified three groups of countries, according to the intellectual capital: the „leaders“ group formed by the Nordic countries (Sweden, Denmark and Finland); the „challengers“ group (Belgium, Netherlands, Luxembourg, Germany, France, Austria, United Kingdom and Ireland) and the „laggard“ group (Italy, Spain, Portugal and Greece). The same study shows, however, that there was a continuous growth of the intellectual capital over time in all countries, both in terms of investments, but also of the created assets and the economic effects of those assets. Nevertheless, if a comparison is realized between the major competitors of the European Union (the United States and Japan), it is observed another backwardness of Europe.

3. Recent evaluations of the intellectual capital at the European Union’s level
Based on a similar methodology, Wezniak (2007) proposes an alternative model for measuring the intellectual capital of a country and calculates an index of the intellectual capital (IIC). This index explains a significant part of the developmental differences between the EU countries. In Wezniak model are retained four fundamental components of the intellectual capital (human capital, structural capital, relational capital and innovation capital), as well as sub-components of these and the evaluation specific indicators. The main sub-components of the basic elements of the intellectual capital are:

For the human capital: level of education, the quality of the educational system, the quality of the working conditions, use of IT skills, health, degree of satisfaction and happiness of the population, tolerance.

For the structural capital: the number of applications of the intellectual property, the level of penetration of the new technologies, the level of penetration of the new communications systems.

For the relational capital: relations with foreign countries, international trade, mutual trust, behavioral norms.

For the innovation capital: the volume of investments in research – development, the number of scientific publications, applications of the intellectual property from abroad, the rate of the quantity of work consumed in research – development, investments in IT systems.

For each of the sub-components of the intellectual capital have been selected a set of indicators, which were subsequently aggregated in the index of the intellectual capital. Some of the indicators used to estimate, for example, the human capital were: PhD students in scientific and technological fields as % in the population between 20 and 29 years old, the

<table>
<thead>
<tr>
<th>Indicators</th>
<th>HUMAN CAPITAL</th>
<th>STRUCTURAL CAPITAL</th>
<th>RELATIONAL CAPITAL</th>
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</thead>
<tbody>
<tr>
<td>ASSETS</td>
<td>The weight of the active population using the computer in professional purposes and benefited for that purpose of training courses.</td>
<td>Percentage of families connected to the Internet.</td>
<td>The percentage of international meetings organized.</td>
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<td>The weight of the researchers in the total number of employees.</td>
<td>Percentage of firms with access to the Internet.</td>
<td>SMEs participating in various structures of innovation.</td>
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<td>The weight of the population having at least high school studies.</td>
<td>Number of patents and licenses registered at the European Patent Office per one million inhabitants.</td>
<td>Foreign students of the total of students.</td>
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<td>The weight of the adult population (between 25 and 64 years old) integrated in various forms of education and continuous training. Employment rate. Employment rate in areas that use intensely knowledge and modern technologies.</td>
<td>Number of scientific publications per one million inhabitants. Firms’ orientation. Number of days necessary to open a new business. Capital investments as % of GDP. Total public debt consolidated as % of GDP.</td>
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<td>INVESTMENTS</td>
<td>Public expenditure on education as % of GDP. Public expenditure in actions of work policy as % of GDP.</td>
<td>Expenditure on hard drives, equipment, software and other related services as % of GDP. Total expenditure with research – development as % of GDP.</td>
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<td>EFFECTS</td>
<td>GDP per hour of work.</td>
<td>The rate of businesses using the Internet for selling and purchases. Value added of high tech industries relative to GDP. The rate of new firms. The share of persons with income below the risk of poverty threshold. Life expectancy.</td>
<td>The degree of international scientific collaboration. The percentage of patents and licenses developed with foreign partners. Exports of rights and licenses. Exports of services. High tech exports.</td>
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Table 1. Measurement indicators of the European Union’s intellectual capital

Based on this model, Andriessen and Stam analyzed the dynamics of the intellectual capital of the European Union for the period 1999–2001, trying to identify if there is any correlation between the value of the intellectual capital and GDP. Related to this aspect, the mentioned authors discovered that there is a significant statistical correlation between GDP per capita and investments in the structural capital (0.531), but, surprisingly, not in the case of the investments in the human capital. In respect of the relative results of measuring the intellectual capital of the European Union member countries, it was concluded, in the same study, that there can be identified three groups of countries, according to the intellectual capital: the „leaders“ group formed by the Nordic countries (Sweden, Denmark and Finland); the „challengers“ group (Belgium, Netherlands, Luxembourg, Germany, France, Austria, United Kingdom and Ireland) and the „laggard“ group (Italy, Spain, Portugal and Greece). The same study shows, however, that there was a continuous growth of the intellectual capital over time in all countries, both in terms of investments, but also of the created assets and the economic effects of those assets. Nevertheless, if a comparison is realized between the major competitors of the European Union (the United States and Japan), it is observed another backwardness of Europe.
participation in the training activities, the professional use of the Internet, number of researchers at 1000 inhabitants, degree of happiness, etc. In order to evaluate the relational capital were chosen, among others, the following indicators: the students originated from the EU as % of the total students in the country, registered patents at the United States Trade and Patents Office (number of patents per one million inhabitants), exports of high technology products, confidence in the judicial system and in the police, confidence in the administrative system, etc. In respect of the indicators used to measure the structural capital, we distinguish: the numbers of patents registered at the Patents European Office per one million inhabitants, the % of firms with access to the Internet, the number of European high-tech patents per one million inhabitants, the number of subscriptions to public communications systems, etc. Finally, some of the indicators by which the innovation capital was surprised are: the annual expenditure of public and private educational institutions per student compared to GDP per capita, expenditure with research – development as % of GDP, expenditure with informational technologies as % from the GDP, total expenditure on education as % of the GDP etc.

Regarding the relative results of measuring the intellectual capital of the European Union member countries, we differentiate four groups of countries according to the level of the intellectual capital: „leaders“ group including Sweden, Finland and Switzerland, the „pretenders“ group with Denmark, Germany, Netherlands and Austria, the „challengers“ group with Slovenia, Ireland, Norway, Iceland, Luxembourg, France, Belgium and the United Kingdom and the „laggard“ group with Spain, Czech Republic, Lithuania, Latvia, Estonia, Portugal, Slovakia, Poland, Hungary and Greece. In the same paper, it is emphasized a close correlation between the intellectual capital and the GDP per capita, which shows that this index has a very high informational contribution. The Danish Government has designed and implemented a model, the Structural Monitoring System, which allows the measurement the country’s position relative to other nations (Sweden, Germany, Netherlands, UK, USA and Japan) which hold competitive positions in those activities that are crucial for the national prosperity and welfare. This system provides information on the position of Denmark in a number of fundamental subdomains for the welfare and standard of living of the population, using for this purpose more than 300 indicators (Danish Government, 2000). The use of a large number of indicators accentuates the importance of the economic results derived from the valorization of the intellectual capital, including by the direct influence of the wealth and prosperity of the country. The Structural Monitoring System consists of four main dimensions:

1. Productivity and the economic situation of firms.
2. Transports, infrastructures and environment.
3. General economic and social conditions.

In the dimension productivity and economic situation of the firms, are included indicators regarding the capacity of innovation, research–development, telecommunications infrastructures and informational technologies, external trade, the level of competitiveness, etc. In the dimension transports, infrastructures and environment, there are approached globally the infrastructures pertaining to transports and environmental protection policies. Inside the block of general economic and social conditions, are captured the country’s macroeconomic conditions, including taxation, employment, educational system, etc. Finally, within the dimension regarding the quality of the public service and welfare, there are approached health, social security, the way of redistributing incomes, the conditions of families with children and the elders, the accessibility and efficiency of public services.

Except the proposals concerning the measurement models, there are other initiatives that contribute to the development of the intellectual capital of the countries. For example, the analysis of benchmarking type stands out – „Netherlands Benchmarking 2000“, conducted by the Dutch Ministry of Economic Relations. This study, based on the national competitiveness indicators, evaluates the economic conditions of the Netherlands compared to best practices found in Japan, Australia, Belgium, USA, Denmark, New Zealand, Germany and the United Kingdom, in order to define some strategies of consolidation of the strengths and reducing the national weaknesses. Based on this analysis, there are initiated studies concerning some specific fields (the macroeconomic environment, the human capital, the innovation climate, the physical infrastructure, the products and services markets, the financial market), the selected indicators for each of them in terms of a SWOT-type analysis.

Likewise, there are frequent the competitiveness studies, as well as those related to the identification of some sets of indicators at national level, of scoreboards type. For example, we will mention the European Innovation Scoreboard system realized by the European Commission and Science, Technology and Industry Scoreboard, developed by the OCDE. Both reports, published annually starting with 2000, include dozens of indicators concerning innovation and IT development, the educational level, continuous training and high tech sectors. In this regard, it may be mentioned the OCDE (2007) initiative concerning the development and welfare of the nations, analysis that
A complex model of evaluation of the intellectual capital of a territory is proposed by Sanchez (2003). This model has as benchmark the following definition of the intellectual capital: the intellectual capital of a territory is the ensemble of assets available to the territory and which, even if they are not neither physical nor financial; they generate the sustainable development both in an isolated manner and also in connection with other territories. Examples of such intangible elements include: civil security, civic awareness on the use of energy resources and recycling, environmental quality, quality of public services and administration, etc. The Sanchez model consists of 7 dimensions, of which 6 for each type of identified intellectual capital (touristic capital, economic activity capital, social capital, ecological capital, administrative capital and training and development capital) and one (residual capital) which represents the effects of acquiring intangible assets that belong to other dimensions.

4. Conclusions
Given the accelerated emergence of the knowledge economy, the problem acutely posed is of the elaboration of some systems which should allow the correct measurement of the intellectual capital of a territory, to adequately reflect the value of this capital and facilitate the adoption of some effective public policies for the management of the intangible resources. Thus, the practice of identifying and measuring the competitive ability of a territory involves an exercise which goes beyond the traditional sets of economic-financial indicators (based especially on the gross domestic product), needing non-financial indicators which capture the stock and dynamics of the intangible wealth. However, the study and analysis of measurement and management processes of the intangibles at national and regional level are still at an early stage, the papers proposing models of intellectual capital in territorial profile being still quite rare. The few experiences presented in this material allow us to conclude that currently there is still no clear methodology and a common reference framework for measuring the intellectual capital of the nations and/or regions.

We believe that a starting point in the approach of elaboration of an efficient model of management of the intellectual capital of the territory is represented by the strategic objectives of development of the given territory. Based on these, there may be defined subsequently the critical intangible assets and may be developed a set of indicators for each of these assets. Undoubtedly, it is required a periodic review of the model, in order to adapt it to the new conditions and challenges.

References