Intellectual capital for economic growth

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Abstract

Economic growth is connected with human capital growth - skills and knowledge of workers. At a certain level of technological development new knowledge and ideas will accelerate growth. We can observe and measure the knowledge economy from the national perspective and international comparison. For the measurement of the influence of knowledge on national competitiveness the concept of human capital has to be upgraded. We need to examine intellectual capital, which consists of several components, and create a system of internationally comparable indicators. The author proposes a model for measuring intellectual capital at national level, based on a set of indicators relating to human capital by gender, business environment, market capital, innovation, technology and development capital. More important nowadays, with the fast increasing enrolment of women in universities and the prevailing number among graduates, is to observe the intellectual potential of modern well educated women, the level of female intellectual capital, the incorporation and employment of women intellectuals in society. Are we, in the knowledge economy involved, according to our professional expertise or are we intellectual capital in waiting? Is the main reason for the limited impact of innovation on productivity because of the gender gap in intellectual capital – of neglected women’s brains?

Keywords: smart economic growth, intellectual capital
Smart growth is the main target of the Europe 2020 strategy

European development strategy Europe 2020 – Smart growth and jobs – sets three self-reinforcing priorities: firstly, smart growth - developing an economy based on knowledge and innovation. Three of seven flagship initiatives seek to catalyze progress under the rubric of smart growth:

The First EU flagship initiative - "Innovation Union" – has the aim to improve framework conditions and access to finance for research and innovation so as to ensure that innovative ideas can be turned into products and services that create growth and jobs;

The Second EU flagship initiative – "Youth on the move" – has the aim to enhance the performance of education systems, and to reinforce the international attractiveness of Europe's higher education and to facilitate the entry of young people into the labour market;

The Third EU flagship initiative – "A digital agenda for Europe" – seeks to speed up the roll-out of high-speed internet connections and reap the benefits of a digital single market for households and firms.

The development targets are intended to be measurable in order to monitor the progress at EU and at national level where specific national targets are set. However among the indicators only one is proposed that corresponds to the ambitious goal of increasing the share of the population aged 30-34 with tertiary education qualifications from 31% to at least 40% in 2020 (US 40%, Japan 50%).

Smart growth is therefore based on educated employees – on intellectual capital. However, in reality the European Commission with its austerity measures completely neglects intellectual capital and treats people only as costs - the focus is solely on reducing labour rights and lowering labour costs. It looks as if the European Commission has prepared and adopted a development strategy for this decade just to maintain a favourable impression among naive Europeans. Nevertheless, only those countries who pay close attention to intellectual capital can count on a great future.
Human capital in economic theory and some empirical evidence

Human capital is the microeconomic term referring by definition to the knowledge and skills accumulated by people in the process of their education and training. The pioneer of the term, who in early 1964 published a book *Human Capital* was Gary S. Becker, Nobel Laureate (1992) from the University of Chicago (Becker 1993). In his view, the new economy has increased the value of education and the returns on investment in education. The macroeconomic dimension of education and human capital investment is a contribution to economic growth and development.

Economically we can measure human capital as a ‘stock’ or ‘flow’ type of indicator, where the first represents the level of education and the knowledge of people, and the second reflects the process of education. Highly educated and skilled people have an economic advantage in the labour market, earning a higher income that is a return on their investment in education. The income level is a function of education and experience; more highly educated people command a higher price for their skills and thus earn a higher income on entering the labour market and experience a more rapid growth in earnings during their working life cycle (Samuelson 1995).

Human capital is, within macroeconomic theory, one of four factors of economic development beside natural resources, capital formation and technology. The most important among the factors has nowadays become human capital, as capital goods can simply be bought, but can only be effectively used in the economic process by the well-educated and skilled workers.

The neoclassical model of economic growth is based only on capital accumulation, while other factors such as the quality of the labour force, technology and natural resources remain constant. An increase of capital per employee will increase aggregate output per worker and the economy will move up on the aggregate production function. In the long run, the neoclassical model leads to a steady state of the economy where capital returns become constant and incomes stop growing (Samuelson 1995).

Economic development is connected with the absorption capability that is defined by the quality of human capital. Growth conflict is psychological process when people due to the
lack of knowledge begin to oppose to the progress. Therefore investment to the machines and equipment must be necessarily accompanied by investment into human capital. Investment from economic point into human capital means education and training of employed people. Educated people are in the present time an active factor of economic development (Mankiw 1994).

However, the competitiveness of a modern hi-tech post-industrial economy is closely connected to the quality of human capital. Economic development is related to the fast technological development accompanied by ICT development and flow of information around the world. Economic development is based on the technological development that needs a highly qualified and innovative labour force. Technological change shifts the aggregate production function upwards, showing the advances in productivity. Simultaneously technological development is accompanied by human capital development that causes a second shift of the production function upwards, raising output per worker – labour productivity, together with rising wages and increasing living standards (Samuelson 1995). Research on economic growth has emphasized that human and physical capital are both important for ‘explaining international differences in standards of living’ (Mankiw 1994).

Econometric studies (OECD) confirm a significant positive impact of human capital accumulation on productivity (output per employee) and economic growth. Although human capital theory is clearly defined, some dimensions are more difficult to quantify empirically. Human capital defined as capacity for work has five categories (UN 1996): individual knowledge, experience, skills, capability for work (health), willingness and readiness to work (personality). Some of them are measurable, while others have to be estimated.

The system of national accounts (SNA) includes estimates of national wealth from different aspects: production, consumption, income, capital and financial accounts but no estimates of human capital or labour accounts yet. The first attempt was made in Australia with experimental measures of the value of human capital stock with the key notion that ‘the economic value of human capital embodied in individuals can be expressed as the discounted present value of the lifetime income streams that they can earn by applying their knowledge and skills’. (OECD 2001b).
Human capital stock is most often measured by the educational attainment of people according to personal characteristics like age, gender etc. Another method of human capital stock measurement is observation of labour income paid in a year, assessment of the future income for each group of people according to their educational attainment, to achieve the estimated aggregate value of human capital. The static model-based estimate is derived from current level of education, while the dynamic model also takes into account the education in process (work-training stage and work stage). Human capital flow is measured also by the observation of people by age - youth and adult - in the process of education and training.

**Intellectual capital performance and economic growth**

Intellectual capital is a broader concept than human capital and refers to other non-financial resources that determine the value and the competitiveness of an enterprise and national economy. The value of an enterprise consists of the physical assets – capital and financial assets, according to customary accountancy practice. From SNA a balance sheet measures the value of assets and liabilities; the total value of assets owned by an institutional unit or sector or national economy minus the total value of its liabilities is described as its net worth. Among the intangible assets the SNA mentions only patented entities.

However, the missing part in the balance sheet of both enterprise and national economy is the most important intangible asset of the modern economy - Intellectual Capital (IC). Intellectual capital is the source of wealth of both company and national economy and is the driving force for smart economic growth.

Generally the main elements of Intellectual Capital (IC) are the following:

- Human capital - knowledge and competences of employees;
- Relational capital - relations with external subjects: suppliers, customers, partners, clients (brands), research centres, etc.;
- Organizational capital - collective know-how: information systems, databases, patents, innovations, intellectual property, etc.

Edvinsson (2004) distinguishes the following components of intellectual capital: customer capital, organizational capital and human capital.
The intangibleness refers to the fact that IC is not measured in financial terms. All assets of a company/sector/nation have their value in currency. Intellectual capital consists of elements, like the quality of employees or a brand, for which there is no monetary model.

In the last decade there were several attempts to measure intellectual capital and these differ according to the definition of intellectual capital and the available databases for IC indicators. Mostly the focus was IC at enterprise level, but the scheme, data and indicators differ from micro- to macro-level.

The author of this paper proposes a model for measuring intellectual capital at the national level, that is based on a general indicator and a set of development indicators related to human capital by gender, business environment, market capital, innovation, technology and development capital. The main stress is on quantitative data.

In addition, the author has created a system of IC performance and growth-oriented indicators at national level. Indicators should measure qualitative improvement. The ambition is also to create a model with indicators for in-depth analysis at the national level. For most of the indicators, statistical or other data already exist; some of them would need new data sources and some would need new surveys. Several indicators already exist in the databases of international institutions but they are rough and developed mostly for performance-analysis and international comparison. Most of them are not growth-oriented, some are calculated only qualitatively (using a scale of 1-10), and some are no longer relevant in the modern age.

A general national intellectual capital indicator in our model is calculated on investment in higher education, research and development, and software. Expenditure consists of public, business and private investment. Data on expenditure mostly exist already in national and business statistics. The main aim of this indicator is to observe development in time and international comparison. A general IC indicator will be represented in value and as a proportion of GDP (measured by PPP).

Human capital is the core component of intellectual capital and represents competences, knowledge and personality attributes embodied in the ability to perform labour so as to produce economic value. The proposed indicators are: employment with university degree, enrolment-rate – higher education, graduation-rate – higher education, life-long learning, all by gender and published books.
Employment by education is focused on the university degree, which has to be further described as university, masters degree or doctorate. It is important to observe employed with higher education by industries and calculate the percentage of all persons in employment. Data and indicators on employed persons by education need to be observed more in-depth by gender and 5-year age groups.

Enrolment-rate and graduation-rate in higher education are standard flow-type indicators but have to be observed also by gender. For matching labour market measurement it is important to observe graduates by kind of study and profession. Life-long learning is necessary for the majority of employed people in the modern world. However, only having tertiary education is not enough. Intellectuals for smart growth need to be inventive, creative, innovative people, not relying on standard methods and procedures in work. Edvinsson (2002) distinguish three components of intelligence: intelligence quotient (IQ), emotional intelligence (EQ) and synoptical - creative intelligence (SQ). While IQ represents rational intelligence, SQ is above the IQ and EQ encouraging growth and development.

An indicator using published books is proposed also by Edvinsson as a measure of culture, also demonstrating open-mindedness. A narrow-minded culture cannot be creative.

Business environment is measured differently at a micro- and macro-level. At the micro level it represents relational capital – involving customers, suppliers, partners, etc. At the macro level it is reasonable here to observe: enterprise start-ups, the survival rate of newly formed enterprises, business structure by size of enterprise and knowledge-intensive enterprises or industries. The first two indicators are important business indicators and are already available. It would also be important to observe indicators more in-depth: by industries, also by employment. Indicators on knowledge-intensive enterprises need to be developed by survey.

Market capital at the micro-level is the result of economic activity, output and value-added. At the macro level, the proposed indicators are: GDP per capita, productivity, exports as a proportion of GDP, exports of hi-tech products and services, business investment. GDP per capita is an important and frequently used indicator, measuring growth and the level of development. Productivity is an indicator of the effectiveness of economic activity and needs to be observed by category of activity. Exports as a proportion of GDP is a standard indicator,
representing openness and competitiveness of the national economy. Exports of hi-tech products and services are a new indicator and are more important in modern economies. Business investment has a key development role; SNA data in most cases represent total value including public investment.

Innovation is the next component of intellectual capital and would be well measured with the following indicators: value-added in hi-tech industries, employment in hi-tech industries, innovative enterprises and business intelligence. Value-added and employment in hi-tech industries are indicators of a knowledge economy and should be deployed as such. The indicator of innovative enterprises needs to be developed. The business intelligence indicator represents ICT use in enterprises. The indicators of computers per employed person and access to internet are no longer relevant. Nowadays everybody has a computer and access to internet at work. The indicator should be upgraded for the contemporary world the mere use of software is also not sufficient. There are five steps to maximize the value of information according to the information evolution model IEM (Davis, Miller, Russell 2006):

- **Operational level**: characterized by individual data ownership and control,
- **Consolidation level**: from individual to department level perspective,
- **Integration level**: from department to enterprise level perspective,
- **Optimization level**: enterprise is closely aligned with its markets and gains market leadership by applying predictive insights about customers, suppliers and business partners,
- **Innovative level**: in which sustainable growth and most revenue potential is fueled by continuing creativity and renewal. Here a significant percentage of revenue is gained from projects and ideas less than three years old.

The information evolution (IEM) model is developed at enterprise level but is useful for national level, using already designed surveys. Here we observe the information systems and databases. An intelligent enterprise is progressive and survives in turbulent times for business.

Technology and development capital at the micro-level partially represents organizational capital (patents, intellectual property); at the macro-level relevant indicators would be:
research and development employment, number of patents and patents per employee; all data and indicators should be observed in greater detail according to category of industry.

**Intellectual capital model – IC performance and growth indicators**

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<thead>
<tr>
<th>Human capital</th>
<th>Employment with university degree (in all), by gender</th>
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<tbody>
<tr>
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<td>Enrolment-rate – higher education, by gender</td>
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<tr>
<td></td>
<td>Graduation-rate – higher education, by gender</td>
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<td></td>
<td>Life-long learning, by gender</td>
</tr>
<tr>
<td></td>
<td>Published books / population</td>
</tr>
<tr>
<td>Business environment</td>
<td>Enterprise start-ups</td>
</tr>
<tr>
<td></td>
<td>Survival rate of newly born enterprises</td>
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<td></td>
<td>Business structure by size of enterprise</td>
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<td></td>
<td>Knowledge-intensive enterprises</td>
</tr>
<tr>
<td>Market capital</td>
<td>GDP per capita</td>
</tr>
<tr>
<td></td>
<td>Productivity, value-added per employee</td>
</tr>
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<td></td>
<td>Exports as a proportion of GDP (export ratio)</td>
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<td></td>
<td>Exports of hi-tech products and services</td>
</tr>
<tr>
<td></td>
<td>Business investment</td>
</tr>
<tr>
<td>Innovation</td>
<td>Value added in hi-tech industries</td>
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<tr>
<td></td>
<td>Employment in hi-tech industries</td>
</tr>
<tr>
<td></td>
<td>Innovative enterprises</td>
</tr>
<tr>
<td></td>
<td>Business intelligence</td>
</tr>
<tr>
<td>Technology and development</td>
<td>Research and development employment, by gender</td>
</tr>
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<td>Number of patents</td>
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<td>Patents per employee</td>
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Women are still intellectual capital in waiting

It is more important nowadays, with the rapidly increasing enrolment of women in universities and the current number of women graduates, to observe the intellectual potential of modern well-educated women, the degree of female intellectual capital, incorporation and employment of women intellectuals in society.

Two thirds of university graduates in Slovenia in 2009 were women. On the other hand data concerning the gender pay-gap (Česen 2003) indicate that the biggest wage differential is between men and women with a university degree, even within the same business activity. According to the level of professional skills, the highest and increasing female wage differential is among university degree-holders: women earn one-fifth less than men, mostly because of occupational segmentation and an inferior position in the work hierarchy.

Are women in the knowledge economy involved according to their professional expertise or are we intellectual capital in waiting? Women are seldom represented in the group of best-paid occupations or work positions. Among the best graduates from grammar school, a substantial majority are girls, while on the other hand among the best-paid people there is not even one woman, only men. Stereotypes concerning gender-roles in public and private life still prevail.

Is the main reason for the limited impact of innovation on productivity because of the gender-gap in intellectual capital – unconsidered women’s brains? The picture of the labour market by gender shows a high participation rate of women, high educational involvement and success, but a persistent pay gap due to inferior positions in the work hierarchy. The concept of equal opportunities for women intellectuals is challenged by the continuing divergence between conventional wisdom and reality. The available data picture women intellectuals, in waiting for their career opportunities. However, the importance of female intellectual capital is growing; it represents an intellectual capital reserve for future smart growth and development.
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