# INTELLECTUAL CAPITAL AS THE BASIS FOR ECONOMIC DEVELOPMENT AND COMPETITIVENESS

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***Abstract***

*The influence of global energy crisis, COVID-19 pandemic, as well as the penetration of information and communication technologies in all aspects of life, require radical changes in the attitude towards modern economic trends. Today, knowledge is of strategic importance to economies around the world, and the thesis that countries have competitiveness based on relatively cheap factors of production, such as raw materials, energy, or cheap labor, does not apply in the case of many countries. The example of Japan, Singapore, Switzerland, Finland, Luxembourg or Israel, illustrates how a competitive advantage can be obtained due to knowledge even in conditions of expensive energy, lack of raw materials, expensive labor etc. Therefore, in addition to the positive attitude toward changes, great knowledge is needed in order to achieve progress. Knowledge, that is, its economic embodiment in intellectual capital, is becoming a key factor for competitiveness of both national economies and firms. Hence, this paper aims to introduce the concept of intellectual capital as the basis for economic development and competitiveness.*

***Keywords:*** *intellectual capital, economic development, knowledge, intellectual property, competitiveness.*

## INTRODUCTION

Today, the world economy is going through "tectonic" shifts and constant transformations. In a situation of global energy crisis and consequences that are still present as a result of the COVID-19 pandemic, when markets and competitors are changing significantly, and technologies are rapidly advancing, knowledge appears as the basis on which the entire development potential of modern economies is based. Therefore, the development of knowledge, that is, its economic embodiment in intellectual capital, today, it is a condition for economic, technological and any other form of progress. Intellectual capital has turned the 21st century into a century of intellectual competition and a knowledge-based economy [1] (Kokeza, 2017).

## THE ROLE OF INTELLECTUAL CAPITAL AT THE FIRM LEVEL

Intellectual capital represents a relatively new economic category that represents the factors of business operations that are of an intangible nature and are not explicitly expressed in conventional accounting reports, that is, they represent invisible assets, but have a great impact on the long-term profitability and competitiveness of a company. Its structure is consisted of three constituent elements: (1) human capital (the sum of production skills, talent and knowledge of employees), (2) structural capital (organizational structure, organizational culture, intellectual property) and (3) relational capital (relationships with consumers, distributors, suppliers, brand, trademark, etc.).

The essence of a firm's intellectual capital lies in the value creation process. Value in a firm can be created when human capability (human capital) creates new business processes (structural capital), resulting in better products for consumers and increasing their loyalty (relational capital). Moreover, the interaction between the three constituent elements of intellectual capital is unique and unlike the usual material goods where "1+1 equals 2", the nature of intellectual capital is that "1+1 can give 3, 4 or more", that is, that it is characterized by the synergistic effect. Hence, it is not at all surprising that in the last few decades, the share of intangible assets, i.e. intellectual capital, in

the total value of companies is increasing, while the role of tangible assets is decreasing. It is estimated that 90% of the value of successful companies is attributable to intangible assets, i.e. intellectual capital. This can be especially seen in the ratio of tangible assets and intellectual capital in the total market value of the 500 most successful American firms in the period from 1975 to 2020 (Figure 1). The main reasons for this trend are the exceptional development of information and communication technologies, the growing legal protection of intellectual property, but also the impact of the health-economic crisis caused by the COVID-19 pandemic.

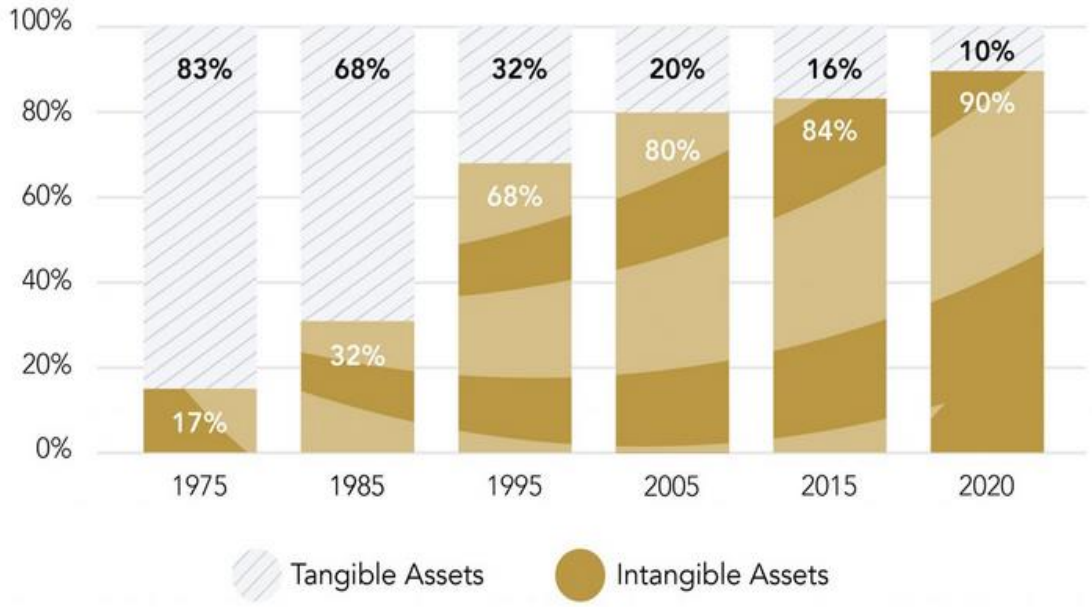


Figure no. 1. Components of S&P 500 Market Value
Source: Ocean Tomo (2020), Intangible Asset Market Value Study, достапно на: http://www.oceantomo.com/intangible-asset-market-value-study/

**National intellectual capital**

Intellectual capital is becoming a strong factor in today's economic reality. It is evidence that intellectual capital is a key factor for the economic development of modern countries, and because of that there are numerous examples of countries that are poor in natural resources, but that one with a highly educated population, achieved a significant growth rate of the gross domestic product. The example of Japan, Singapore, Switzerland, Finland, Luxembourg or Israel, illustratively shows how a competitive advantage can be developed by applying knowledge even in conditions of expensive energy, lack of raw materials, expensive labor, etc. Hence, in recent times, the concept of intellectual capital has been expanded from the microeconomic level (firm level), to the macroeconomic level (national and regional level). National intellectual capital is defined as the sum of all intangible resources available to a country, which give it a relative (comparative) advantage over other countries and which in mutual combination can produce future benefits for that country. The same model can be used for determining the national intellectual capital as for determining the intellectual capital at the firm level. However, at the macroeconomic level, invisible assets are usually changed to match the aggregate level. At the national level, by analogy with intellectual capital at the firm level, it is usually about: national human capital, national structural capital and national relational capital. At the same time, national human capital, as the first class of intangible assets at the macroeconomic level, represents everything related to people in a country: knowledge, education and competencies of individuals needed to realize national goals. National structural capital is the second class of intangible assets at the macroeconomic level and includes non-human knowledge goods that are embedded in national technological, information and communication systems. National relational capital, as the third class of intangible

assets in a country, represents the capacity of a country to provide an attractive and competitive environment. Considering that this is a field of study that is currently developing, it should be emphasized that there is still no unified classification for the components of national intellectual capital and the variables for its measurement.

In this context, the existence of negative national intellectual capital and the loss of national intellectual capital should also be mentioned. For example, most of the countries of Eastern and Central Europe, which dogmatically adhered to the principles of Marxism in the period from the end of the Second World War in 1945 until the collapse of the USSR in 1991, had accumulated a huge "communist" intellectual capital. This intellectual heritage from this period is strongly felt in these countries during the period when they transited towards market economies. Important social institutions such as an effective legal system, efficient banking system, protection of private property rights and other institutions necessary to achieve economic development in a market economy, simply did not exist in the former communist countries. Loss, on the other hand, of national intellectual capital can occur as a result of wars, environmental disasters, health crises, economic crises, energy crises, etc., when there is a loss of human lives or people moving to other countries, loss of natural resources, destruction of infrastructure facilities, collapse of businesses and etc. (The destroyed library in Alexandria is perhaps the first impressive example of lost intellectual capital in the history of human civilization. Today, the situation with the war in Ukraine is current, when the Ukrainian national intellectual capital is irretrievably lost.).

**The impact of intellectual capital on national competitiveness**

Competitiveness lies at the core of the success of modern economies and firms. The proactive role of the state in achieving a competitive advantage is realized first of all through the creation of a social environment in which knowledge gets an appropriate place and role as it is an important assumption for the national economy development and for the growth of its competitiveness. When it comes to national competitiveness, one of the most comprehensive indices for assessing a country's economic competitiveness is the Global Competitiveness Index (GCI) of the World Economic Forum. It measures the average of many different components that are grouped into twelve pillars, each of them reflecting some aspect of the complex reality called competitiveness (Figure 2). The twelve pillars of competitiveness are united into three separate entities: (1) basic conditions, (2) efficiency enhancers, and (3) innovation and sophistication. These units (sub-indices) are related to the three stages of development of the respective country/economy: Factor-Driven Economies, Efficiency-Driven Economies and Efficiency-Driven Economies. innovation factors (eng. Innovation-Driven Economies). Moreover, the first sub-index is composed of pillars 1-4, the second sub-index from pillars 5-10, the third sub-index from pillars 11 and 12. Each country, based on the global competitiveness index report, can create appropriate measures to improve its competitive position. At the same time, it should be taken into account that out of the twelve pillars of competitiveness, six of them are related to education, research and science. These are: health and primary education (pillar 4), higher education and training (pillar 5), labor market efficiency (pillar 7), technological readiness (pillar 9), operational sophistication (pillar 11) and innovation (pillar 12 ).

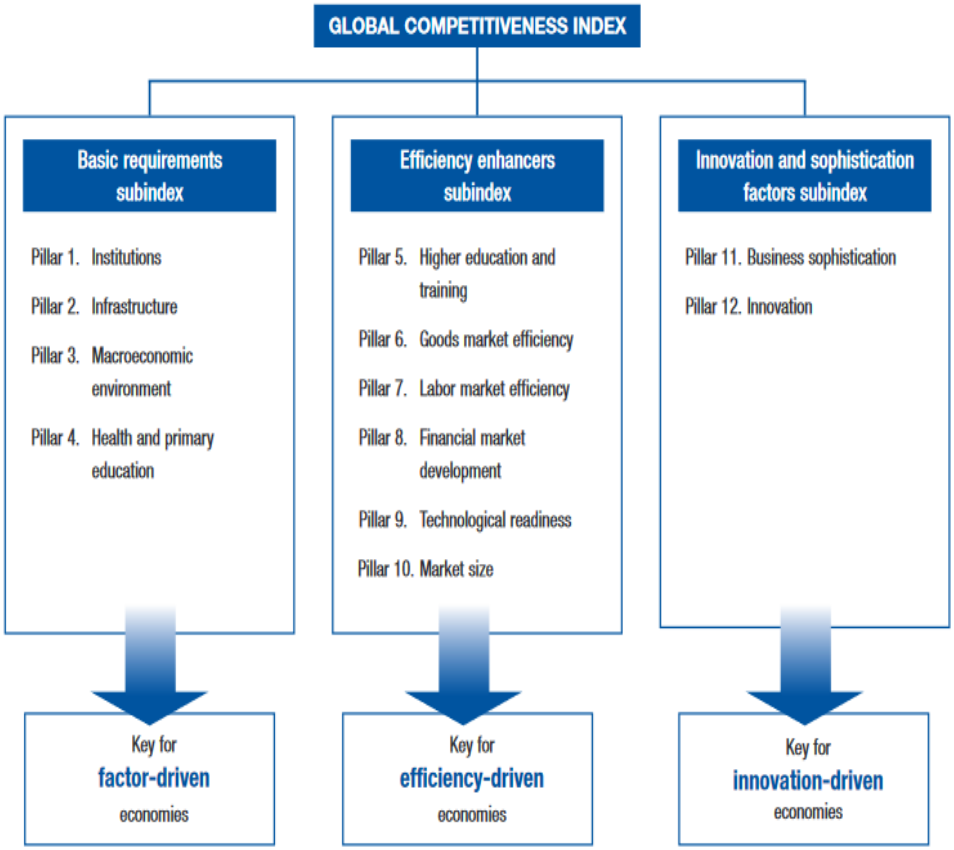


Figure no. 2: The Global Competitiveness Index framework
Source: Schwab Klaus (Editor), Sala-i-Martin Xavier (2017), *Global Competitiveness Report 2017-2018*, World Economic Forum, p. 12

Furthermore, the impact of intellectual capital on a country's competitiveness depends on that country's level of development. The more developed a country is, the greater the impact of intellectual capital on its competitiveness. And vice versa. Intellectual capital has the least impact on factor driven economies. This means that countries belong to this group must focus on building physical and technological infrastructure. The use of new technologies requires educated people, and that is why countries with a low level of development need to improve basic education and professional training. In parallel with this, countries that want access to new technologies should open their borders to foreign investment. At the same time, to focus on the liberalization process not to destroy the domestic economy. The impact of intellectual capital on the competitiveness of efficiency-driven economies is greater compared to the previous group of countries. These countries see their competitive opportunity in investing in vocational secondary and higher education. It is necessary to increase investments in technological infrastructure. Through the analysis of economic potentials and the development of applicable strategies, the development of higher education and other available mechanisms in a country should be directed and conditions for economic development and progress of profitable sectors should be created. In the case of increased unemployment and inflexibility of human resources, it is necessary to invest in training and activation of continuous learning in order to create new opportunities. Intellectual capital has the strongest impact on innovation-driven economies. Here we talk about the most developed countries in the world. They are characterized by large investments in education, research and science, as well as a high level of technological development. To increase their competitiveness, these countries constantly invest in research and development and support creativity and innovation, especially in advanced technologies.

## Mathematical perception of the intellectual capital contribution in the increase of national output (gross domestic product)

In economic literature, the Cobb-Douglas production function is a mathematical relationship that shows how the amount of factors of production (inputs) determines the amount of goods and services produced (outputs). Developed by economist Paul Douglas and mathematician Charles Cobb, the Cobb-Douglas production function is used in both macroeconomic and microeconomic models because such models have a number of practical and realistic features. In particular, this aggregate production function has the following mathematical form: $Y = AK^{\alpha}L^{1-\alpha}$ where Y is output, A is technological progress, K is capital, and L is labor, and α is a positive parameter that ranges between 0 and 1 and measures the share of national income which belongs to capital. Such a standard Cobb-Douglas production function with constant returns to scale can be modified as follows: $Y = AK^{a}(IC).^{1-\alpha}$ In this case, it shows how capital K, intellectual capital IC and technological progress A combine to produce output Y. The parameter α is ranges between 0 and 1. By asking for the partial derivative of this production function by IC (intellectual capital), we actually get its partial effect: . By requesting a partial derivative of the capital K in the same equation, the complementary effect (contribution) of the intellectual capital is obtained: $\frac{\partial Y}{\partial K} = A(IC)^{1-\alpha}\alpha K^{\alpha-1}$. The partial effect actually shows only the contribution of intellectual capital in increasing output (gross domestic product). The partial effect shows the influence of intellectual capital on other factors of production, on the basis of which there is an increase in the national output (gross domestic product).

## Intellectual property as an important factor of modern economic development

Intellectual property, as a segment of intellectual capital, creates legal assumptions for the economic and cultural development of modern knowledge-based societies. Namely, technical-technological progress happens because companies or individual inventors, in the desire to maximize profits, search for new and better discoveries. The opportunity to make a profit is what makes companies and entrepreneurs develop the computer, or produce a handheld camera, or produce calorie-free ice cream. Patents, copyrights, trademarks, etc., are legal mechanisms that guarantee the inventor a monopoly profit for a certain period of time. Without such mechanisms for the protection of intellectual property, it would be difficult to ensure the motivation of companies and entrepreneurs for research work and development. In the context of this, the International Property Rights Index (IPRI) of the Property Rights Alliance (PRA) should be mentioned. This index is actually an annual study that ranks countries based on the degree of protection of property rights (physical and intellectual). The research is conducted on the basis of 10 variables, which are divided into three main components: Legal and Political Environment (LP), Physical Property Rights (PPR) and Intellectual Property Rights. (eng. Intellectual Property Rights, IPR). Here it is important to point out that the countries with the highest IPRI value, on average, have several times higher per capita income than the countries with the lowest IPRI value. In this context, we can mention the example when Hong Kong merged with the People's Republic of China on July 1, 1997, after 155 years of British rule. At that point, the average Hong Kong Chinese was several times richer than the average Chinese in the People's Republic of China. This was primarily due to the Anglo-Saxon legislation according to which the right to property (physical and intellectual) is inviolable.

Table no. 1. Top 5 countries in the world where property rights are the most protected according to The International Property Rights Index, 2021
Source: IPRI (2021), Report, Executive Summary, Property Rights Alliance

| Rank | Country | Coefficient (from 0 to 10) |
|---|---|---|
| 1. | Switzerland | 8,148 |
| 2. | Singapore | 8,087 |
| 3. | New Zealand | 8,079 |
| 4. | Finland | 8,078 |
| 5. | Luxembourg | 7,995 |

On the other hand, piracy and insufficient protection of intellectual property represent a serious problem at the global level. Branded clothing, sneakers, bags, books, software, mobile phones, music, etc. are commonly copied. Medicines and medical devices are also increasingly being copied. The World Health Organization (WHO) estimates that about 10% of medicines are copied every year, and the damage from this to the pharmaceutical industry amounts to about US$ 45 billion. At the same time, it should be emphasized that piracy and insufficient protection of intellectual property represent a much bigger problem for developing countries and their competitiveness than for developed countries and their competitiveness.

## Conclusion

Recently, the concept of intellectual capital has been expanded from the microeconomic level to the macroeconomic level. National intellectual capital is defined as the sum of all the intangible resources available to a country, which provide a comparative advantage for that country. The size of the influence of intellectual capital also depends on the level of development of the country. The more developed a country is, the greater the impact of intellectual capital on its competitiveness. And vice versa. Intellectual capital has the least impact on factor driven economies. The impact of intellectual capital on the competitiveness of efficiency-driven economies has a medium intensity. Intellectual capital has the strongest impact on innovation-driven economies. Here we talk about the most developed countries in the world that are characterized by large investments in education, research and science, as well as a high level of technological development.

Finally, it should be taken into account that intellectual property, as a part of intellectual capital, is an important determinant for the economic and cultural development of modern knowledge-based societies. It often represents the competitive base of a country. In addition, the value of intellectual property can be easily undermined if laws do not protect intellectual rights. Countries that do not provide a sufficient level of legal protection for intellectual products have weaker national competitiveness.

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