

## Evaluation of the role of intellectual capital in innovative economic growth in the framework of knowledge economy

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**Abstract.** The article analyses the role of intellectual capital in innovative economic growth within the knowledge economy. To this end, the essence of social capital phenomena, one of the modern concepts of human capital and institutional economy, which are the main components of intellectual capital, is explained, as well as the impact of research and development activities on economic growth, one of the main indicators of scientific development

**Keywords:** knowledge economy, intellectual capital, human capital, social capital, research and development, economic growth

### PROBLEM STATEMENT

The knowledge economy is a new social and economic era in which knowledge is the most important and basic economic resource, knowledge production and communication are widespread, the number of people working in the field of knowledge is higher than in other fields, and sustainable education and development. In this society, the production, distribution, exchange, use and development of knowledge are the main characteristics of public life. The production, collection and sale of knowledge have led to the emergence of new areas of work in the information (knowledge) society. Knowledge is both the main raw material and the most important product of the modern economy. The elements of capital necessary for wealth, prosperity, and power, physical labour, smoky industrial machinery, factories, and plants have given way to knowledge.

In the post-industrial society, information and knowledge become a key factor in the development of modern society. In the modern post-industrial economy, knowledge is not only the main source of added value, but also a key factor in ensuring competitiveness. Economies in the world that rely on cheap raw materials and cheap labour are already struggling to compete with economies based on knowledge and high technology. The production of knowledge and

information products play an extremely important role in the development and competitiveness of countries moving from the stage of industrial development to the post-industrial stage.

In other words, the development of countries in modern times depends on the development of science-based industries, including technological innovations and new technologies.

Thus, the main source of value in knowledge-based economies is innovation. Innovation is based on intellectual capital. Unlike physical and financial capital, the creation of intellectual capital makes this organization a competitive advantage. Intellectual capital includes knowledge, experience, work habits, intangible assets, software, databases, and trademarks of specific people. In other words, intellectual capital is a system of characteristics that determines the abilities of a person (in other words, the quality of the workforce of an individual, enterprise, firm, company, the country's total labour force) that materializes or arises in the labour process.

In the post-industrial economy, the role of knowledge as an economic resource is growing and the importance of intellectual capital in ensuring economic development is observed. Intellectual capital is a

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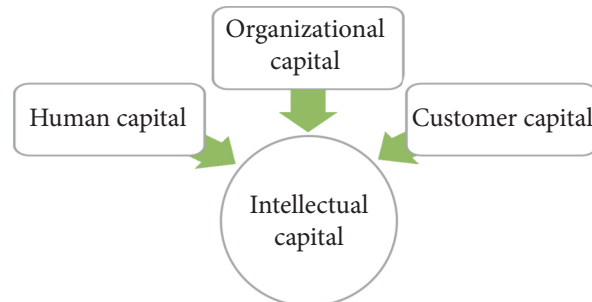
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system that gives organizations a lasting intellectual advantage in the market. The economic literature identifies three components of intellectual capital: human capital, organizational (or structural) capital, and customer capital.

The analysis of the economic literature shows that in its simplest form, intellectual capital consists of three parts: human capital, organizational (or structural) capital, and customer capital (Fig. 1). Each of them can be borrowed or personal [14, p. 46].



**Figure 1.** The simple structure of intellectual capital

Human capital is the most important factor in socio-economic development. But economic development does not depend only on the quantity and quality of knowledge and other economic resources. Thus, in the modern market economy, there are many events and processes of uneconomic nature that the economic system cannot solve, which ultimately seriously affects the results of the system. The solution of monopolies, asymmetric information, income inequality, external effects, the problem of people without tickets, etc., which are among the problems that arise during collective activities, in fact depends on the level of cultural, ethical and psychological development of the social environment. The level of development of socioethical norms in society and the degree of trust between people can be assessed by the concept of social capital. Social capital is one of the basic concepts of modern institutional economy. Economic development can be achieved in countries through the development of both human capital and social capital.

#### ANALYSIS OF ACTUAL RESEARCH

In the knowledgebased economy of the new century, intellectual property and intellectual capital accumulated in it play the role of the main currency. Intellectual property assets have already surpassed material assets and created a new stage in the world economy. Over time, the "concrete and iron-based economy" has become a "knowledge-based", "digital", "creative" economy, as a result of which the phenomenon of intellectual capital, which has been overshadowed for many years, has become the focus of public attention and analysis.

In modern times, human knowledge is the main source of enrichment of the national economy and economic growth. Knowledge comes to the fore from capital, labour and natural resources, which are other components of the production factors.

While labour and capital were the main factors of production in an industrial society, in the postin-

dustrial society more knowledge and intellectual capital came to the fore. In developed countries, the leading sector of the economy is the sector that provides intellectual services.

In conclusion, we can say that the analysis of the following issues related to intellectual capital in the knowledge economy is very important:

- to reveal the socio-economic essence of intellectual capital;
- to analyse the structure of intellectual capital on the basis of different models;
- comment on existing methods for assessing intellectual capital;
- to assess the impact of human (individual) capital, structural capital, technology and social capital, which are components of intellectual capital, on economic growth and economic development;
- to study the stages and features of the process of intellectual capital formation, as well as the factors that directly affect the total intellectual capital of the country;
- to show the relationship between intellectual property, knowledge economy, innovative economy and creative economy;
- to study the experience of advanced countries in the formation of intellectual capital;
- improving the system of protection of intellectual property rights and the mechanism of state support for the development of intellectual capital;
- to determine the main directions of the state policy on the formation of intellectual capital, etc.

*The purpose of the article:* The main purpose of the study is to analyse and evaluate the potential of intellectual capital to increase innovation in the knowledge economy and ensure innovative economic growth.

#### PRESENTATION OF THE MAIN MATERIAL

The concept of intellectual capital was first introduced to science in 1969 by the famous economist J.K. Galbraith. Galbraith wrote that "one of the factors

accelerating industrial society is money. But the factor that accelerates and strengthens the post-industrial society is knowledge. In modern times, new classes have emerged with and without knowledge. This new class does not derive its power from money or goods, but only from knowledge [5, p. 8].

Before defining intellectual capital, it is necessary to explain the concept of "intellectual". Intelligence is a set of characteristics attributed to an individual according to his various abilities, knowledge and skills [1, p. 31].

Intellectual capital participates in the creation of new values. At the macro level, national intellectual capital is perceived as an important part of the knowledge, skills, professionalism and economic growth of the country's population.

P.H. Sullivan, one of the well-known researchers of intellectual capital, noted that intellectual capital covers such important concepts as knowledge, intelligence, thinking and innovation [7, p. 40].

Scientific sources have a relatively expanded model of intellectual capital proposed by A. Brooking (Fig. 2).

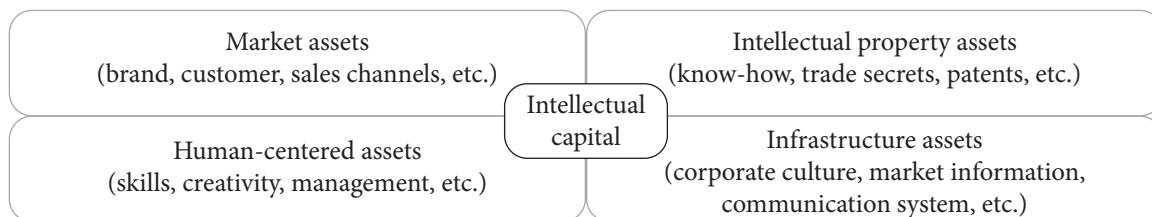


Figure 2. A Brooking's model of intellectual capital

Recent scientific research has also found an brand (customer) and structural capital. According to approach called the "Integrated Intellectual Capital the new model, the structure of intellectual

capital Model" (Fig. 3). According to this approach, includes social, spiritual and technological capital intellectual capital does not consist only of human, [12, p. 17].

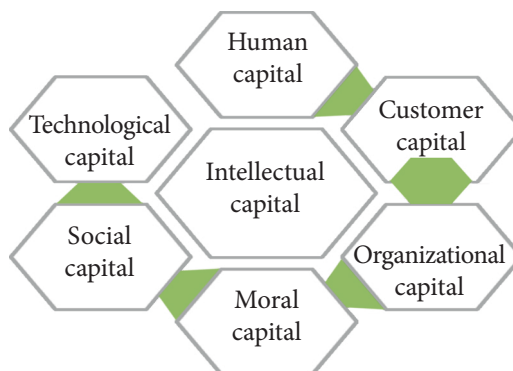


Figure 3. Integrated Intellectual Capital Model

Researchers studying the impact of intellectual competitiveness at both the micro and macro levels, capital on the innovative economy at both the micro especially at the macro level, creates great and macro levels have concluded that increasing opportunities for economic growth and economic development.

Knowledge-based economic activities lead to the rapid enrichment of countries, as they allow the production of products with higher added value and higher productivity. There are several key elements of intellectual capital that affect innovative economic growth and sustainable economic development (Fig. 4).

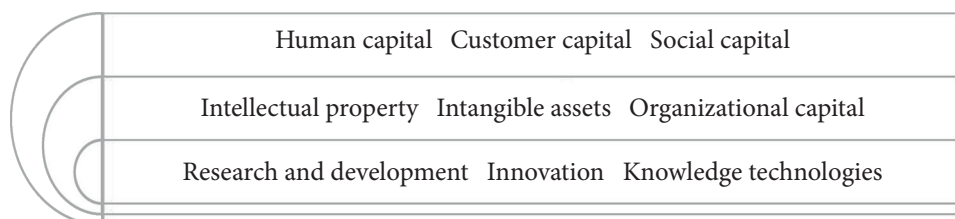


Figure 4. The main elements of intellectual capital that affect economic development

Let us now analyze the impact of intellectual capital on innovative economic growth in three areas:

1. The impact of human (individual) capital on economic growth.
2. The impact of social capital on economic growth.
3. The impact of research and development activities on economic growth.

According to J. Fischer, R. Dornbusch and R. Schmalensee, investments in human capital gradually return in the form of higher wages or as a result of activities that bring more income through this ability [17].

Studies show that the United States, Finland, Germany, Japan, Switzerland, etc. human capital accounts for about 80% of national wealth in developed countries and 60-75% of national wealth in developing countries as a whole. In these countries, 80-85% of GDP growth is due to the development of knowledge. G. Becker analyzed the economic efficiency of investment in education by comparing income with expenditure and determined that investment in education allows to earn 12-14% per year [2, p. 49].

Approaches to the impact of human capital and technological progress on economic growth manifest themselves primarily in economic growth models. To date, three main models of economic growth are known: neo-Keynesian (Domar-Harrod), neoclassical (Cobb-Douglas) and modern models of endogenous technological progress. The current stage of economic growth is based on the efficient use of knowledge

and information resources. The introduction of new technologies will help to overcome crises and depressions, create new production opportunities and the transition to sustainable economic growth. Human capital is one of the key factors in modern economic growth models. In Solow's model of economic growth, technical progress was taken as a condition for basic economic growth. However, this factor was mainly exogenous. Recent researchers G. Mankiw, D. Romer and R. Lucas have tried to clarify and supplement the Solow model, taking into account the important role of the human factor, in overcoming these shortcomings. In the models of economic growth worked by the above-mentioned authors, the Solow model was proposed to expand it by introducing the human factor into its new quality – human capital. The impact of human capital on economic growth in the following years was studied by C. Jones, R. Barro, D. Jorgensen and others through various models [11].

The World Bank uses the "Human Capital Index" to assess the level of human capital development in countries. The Human Capital Index measures the education, skills and health status (health) of the world's population. The index rates countries from 0 to 1. The entire population of a country with a maximum (HCI=1) result reaches the age of 60, while children under the age of 14 receive a full and high level of free education, and no child suffers from malnutrition. The table below shows the HCI rankings for 2020.

**Table 1.** Ranking of some countries of the world according to the "Human Capital Index"

Rank	Country	Score
1	Singapore	0.88
2	Hong Kong	0.81
3	Japan	0.80
4	South Korea	0.80
5	Canada	0.80
6	Finland	0.80
41	russia	0.68
48	Turkey	0.65
53	Ukraine	0.63
75	Iran	0.59
83	Azerbaijan	0.58
85	Georgia	0.57

**Source:** table prepared by the author is based on data from the World Bank

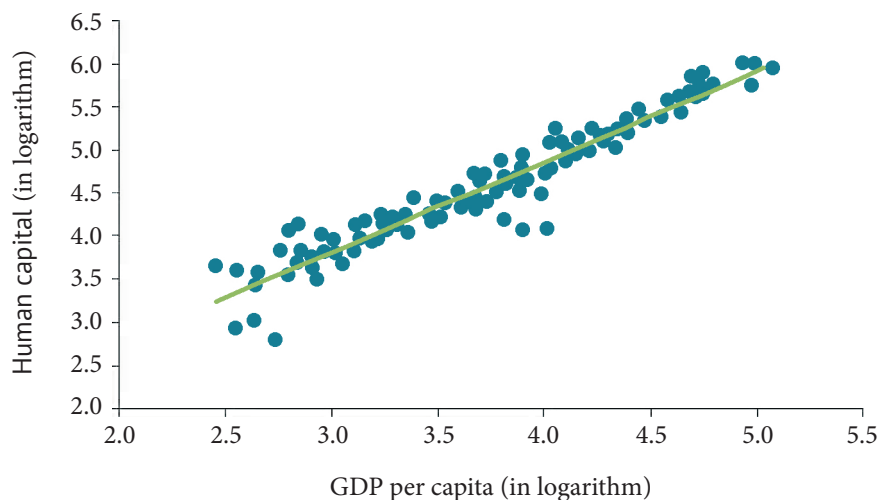
According to the World Bank, between 2012 and 2018, Azerbaijan was able to rise from 0.56 to 0.60 on HCI. In Ukraine, the HCI was 0.647 for 2017, 0.642 for 2018 and 0.631 for 2020.

Human Capital consists of the knowledge, skills and health that people accumulate throughout their

lives and ensure the realization of their potential as productive members of society. Investing in human nutrition, health care, quality education, jobs and skills contributes to the development of human capital, which is essential for the eradication of extreme poverty and the creation of more inclusive societies [9, p. 115-151].

The World Bank's latest analysis, *The Changing Wealth of Nations 2018 (Building a Sustainable Future)*, shows that human capital accounts for 64 percent of global wealth, about 70 percent of the wealth of high-income countries, and only 41 percent of the

wealth of low-income countries (Fig. 5). This underscores the importance of human capital as a stimulus for sustainable economic growth and poverty reduction, as it is more of a stimulus for economic growth than previously understood [9, p. 126].



**Figure 5.** The relationship between human capital and GDP per capita

Thus, economic activities based on knowledge and intellectual capital lead to the rapid enrichment of countries. The goal of any economic activity is to further improve the living standards of the population by achieving higher economic growth. Human capital and technology are also the main sources of economic growth in the knowledge economy, where knowledge has become a strategic product. Investments in science and education generate new knowledge and high human capital, which allow for innovations (technologies) and their application to the economy accelerate the latter economic growth, and higher economic growth allows more investment in science and education.

One of the factors influencing the productivity of human capital is social capital. Social capital is the most important informal institution of the institutional environment. Studies show that societies with a wide range of informal institutions have a healthy environment for the spread of technological change. Trust is the most important element of social capital. It has been observed that countries with a lack of social capital suffer from underdevelopment. Behaviours such as corruption, mistrust, opportunistic behaviour, deviant behaviour, loss of moral norms, which can be explained as unethical behaviour, have a negative impact on human capital and, consequently, slow down economic development. Developed countries attach special importance to social capital because they know that social capital is needed for the efficient and effective use of human capital.

According to Francis Fukuyama, social capital is an informal norm that supports relationships between

individuals. Researcher Laserson showed that in societies with strong social capital, financial issues are more easily resolved between individuals and even companies. One of the positive features of social capital is the increase in economic efficiency as a result of reduced transaction costs between companies. Arrow (1974) also noted that without a minimum level of trust between economic agents, no economic transaction would take place. Trust facilitates economic transactions by reducing transaction costs [3].

In most economic literature, informal institutions are also characterized as social capital. To sum up, we can say that social capital creates positive external effects for group members, and these positive external effects are formed through trust, common norms and values.

Putnam noted that the main effects of bridge-type social capital in the United States are reducing unemployment, reducing crime, and increasing government efficiency. Thus, Putnam affirmed that there is a positive link between social capital and economic growth. In contrast, in countries with low levels of social capital, maintaining law and order and protecting property rights requires significant additional transaction costs. This is evident in the spread of special protection, the height of fences and additional costs on other issues [15].

Putnam explained the link between social capital and economic growth with four main arguments: Strong social capital increases coordination and cooperation for mutual benefit; creates solidarity among the team; ensures the public interest (reduces selfishness); reduces incentives for personal gain [16].

**Table 2.** Ranking of some countries of the world according to the “Social Capital Index”

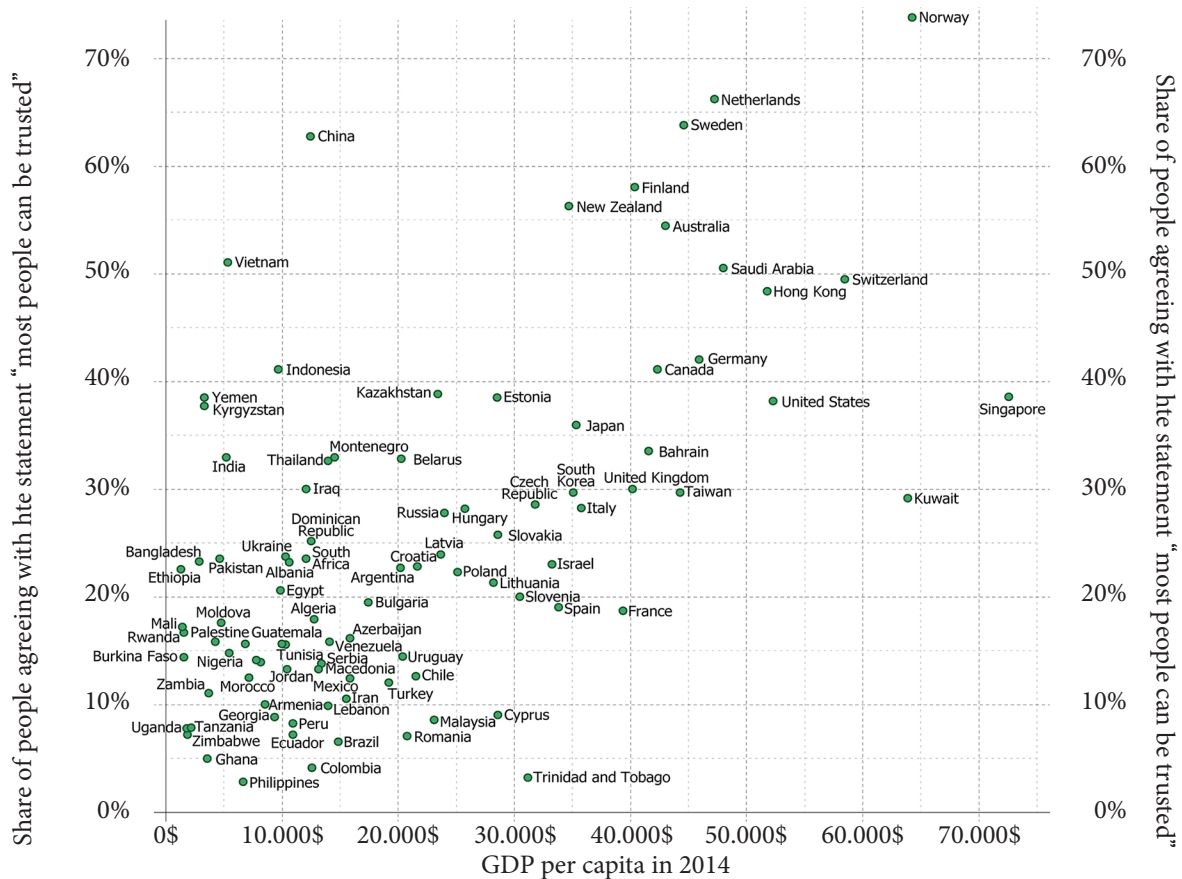
Rank	Country	Score
1	Iceland	65.37
2	Norway	64.96
3	Sweden	61.64
4	Finland	61.57
5	Switzerland	61.00
6	Austria	60.89
60	Azerbaijan	47.87
65	Georgia	47.38
82	Ukraine	44.40
91	Iran	43.06
95	Turkey	42.84
99	russia	41.97
109	USA	41.39

*Source:* table prepared by the author is based on data from the World Bank

Thus, social capital has a positive effect on the efficiency of human capital as it increases trust (institutional trust) between people and between people and between people and institutions. The table below shows the “Social Capital Index” rankings for 2020.

There is no universal methodology for measuring the level of development of institutions in the scientific literature. One of the indicators used to mea-

sure social capital is the level of confidence in countries. This indicator is based on a survey in the country “Do you trust people?” is calculated as the ratio of the number of respondents who answered positively to the question to the number of respondents who participated in the survey. Although there is a positive relationship between confidence and GDP per capita, this relationship is quite fragmented (Fig. 6).



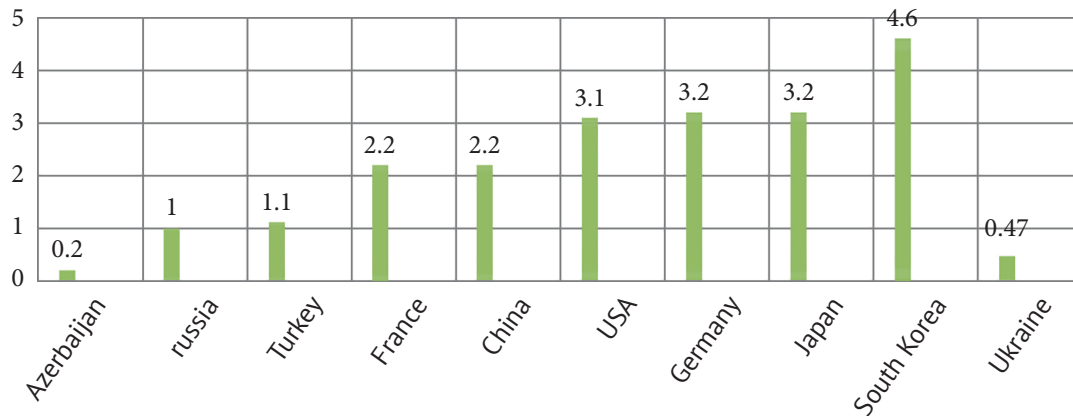
**Figure 6.** The relationship between trust and GDP per capita

*Source:* World Values Survey

Thus, as social capital increases trust between people and between people and institutions, it creates favourable conditions for the development of human capital, and in countries with developed social capital, the level of economic development is higher.

Science has a serious impact on the economy only when it acts as a source for innovation and when the commercial realization of scientific knowledge is possible. A scientific product is the result of a long

process that begins with fundamental scientific research, followed by applied research, design, production, marketing and sales, and finally to the research and development (R&D) expenditures, to commercial stage. One of the main factors affecting GDP is one of the most important indicators of the intellectual capital is the level of spending on level of development of science and innovation in the scientific research. The ratio of these costs, called country (Fig. 7).

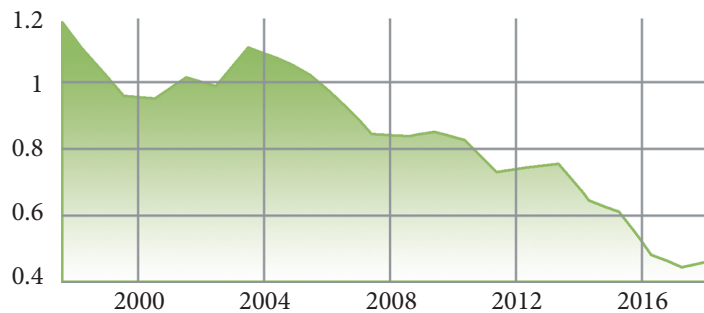


**Figure 7.** Share of R&D expenditures in GDP in some countries (as a percentage)

**Source:** Prepared by the author and based on data from the World Bank

According to 2020 data, the share of research and development expenditures in GDP in Azerbaijan is around 0.2%. If we look at the dynamics of research

and development expenditures in Ukraine, we can see that since 2003, the share of research and development expenditures in GDP has been declining (Fig. 8).

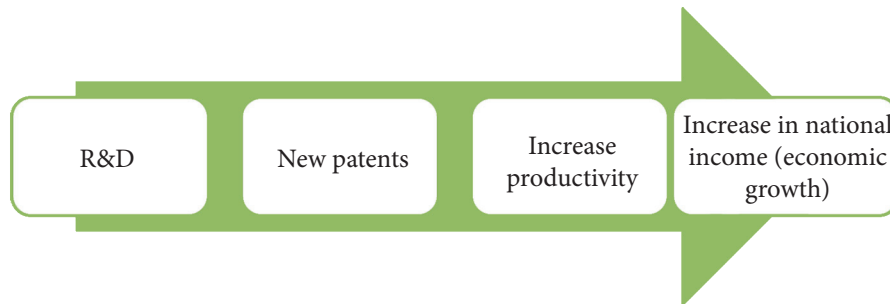


**Figure 8.** Share of research and development (R&D) expenditures in GDP in Ukraine (as a percentage)

**Source:** Prepared by the author and based on data from the World Bank

The impact of research and development spending on economic growth can be simply explained by the following scheme: Studies show that if the allocation of

science to GDP is less than 2 percent, science does not have a significant impact on the economy. For this reason, the transition to a new model of economic (Fig. 9)..



**Figure 9.** The relationship between R&D and economic growth

Studies show that if the allocation of science to GDP is less than 2 percent, science does not have a significant impact on the economy. For this reason, the transition to a new model of economic development based on knowledge can only be achieved by increasing funding for scientific research and thus strengthening science.

Conclusions and prospects for further research. Thus, there is a chain link between the development of intellectual capital and economic growth in the knowledge economy. Therefore, resource-rich economies should strive to build this chain by gradually increasing investment in science and education to ensure the transition to a knowledgebased economy.

The development of human capital is the most important attribute of economic development. Social capital, on the other hand, has a significant impact on an individual's social, educational, health, family and

work life and public administration activities by contributing to the productivity of human capital. Research and development activities have a positive impact on innovation and indirectly increase national income.

Evaluation of the development of intellectual capital is the highest priority problem facing the state in the knowledge economy. Undoubtedly, the main role of the state in innovative economic growth in the knowledge economy is, first of all, a high-quality education system, research universities, technoparks, etc., which the private sector cannot do alone, is forming. Another task for the state is to adopt the rules of the free market mechanism and monitor their implementation. While these rules encourage competition, initiative, creativity and innovation, they must also prevent unfair competition. At the same time, the free market environment is a great incentive for carriers of intellectual capital.

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## **Оцінка ролі інтелектуального капіталу в інноваційному економічному зростанні в рамках економіки знань**

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**Анотація.** У статті досліджено роль інтелектуального капіталу в інноваційному економічному зростанні в рамках економіки знань. З цієї метою пояснюється сутність феномену соціального капіталу, однією з сучасних концепцій людського капіталу та інституційної економіки, які є основними компонентами інтелектуального капіталу, а також вплив досліджень і розробок на економічне зростання основних показників розвитку науки

**Ключові слова:** економіка знань, інтелектуальний капітал, людський капітал, соціальний капітал, дослідження і розробки, економічне зростання

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