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Analysis of Indicators and Factors for Assessing Human Capital Development

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Abstract: Human capital plays a pivotal role in ensuring economic growth and social well-being by integrating components such as education, healthcare, labor productivity, and innovation. In the context of Uzbekistan, significant reforms and policy actions have been undertaken to strengthen these sectors, including national strategies and legislative frameworks supporting education and vocational training, healthcare reform, and labor market development. Despite these efforts, disparities in education quality, healthcare access (especially in rural areas), and labor market efficiency remain, hindering the full realization of human capital potential. This study aims to assess the development of human capital in Uzbekistan using internationally recognized indicators such as the Human Development Index (HDI), Global Competitiveness Index, and empirical comparisons with global models. Findings reveal that Uzbekistan's HDI stands at 0.727 (2022), positioning it among medium development countries. The quality of education and healthcare remains uneven, while labor productivity and innovation activity show potential for improvement. Comparative analysis highlights successful strategies from countries like South Korea, Finland, and Singapore. The study integrates a multi-method approach including SWOT analysis, international benchmarking, and empirical surveys to deliver a comprehensive evaluation of Uzbekistan's human capital framework. To foster sustainable economic growth, Uzbekistan must intensify investments in education, healthcare, and digital technologies, while aligning workforce development with market demands. Human capital enhancement should remain a cornerstone of national development strategies.

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1. Introduction

Human capital is an important component of the modern economy, and its level of development affects the socio-economic stability of the country. The development of human capital depends on factors such as the quality of education, the health system, labor productivity, and innovative potential. This study analyzes the main indicators for assessing human capital and the factors affecting them. Today, human capital is one of the main factors in the sustainable development of society and the economy. World experience shows that the economic development and social well-being of countries directly depend on the level of development of their human capital. Therefore, assessing the development of human capital and determining its main indicators is considered one of the urgent issues [1].

The Republic of Uzbekistan is implementing comprehensive reforms aimed at developing human capital. In particular, the following important regulatory legal acts

determine the main directions in the formation and development of human capital. The Constitution of the Republic of Uzbekistan – establishes guarantees for ensuring human rights and freedoms, developing education and healthcare systems. The Law "On Youth Policy" – is aimed at developing the knowledge and skills of the younger generation, ensuring their employment, and increasing their innovative potential. The Law "On Education" – defines the continuity of the education system and an important basis for the formation of human capital [2].

The Resolution of the President of the Republic of Uzbekistan No. PQ-424 dated November 7, 2022 – establishes measures to improve human capital and the education system within the framework of the "New Strategy for the Development of the Republic of Uzbekistan for 2022–2026" [3].

The Law "On Vocational Education" is aimed at developing a vocational education system that meets the needs of the labor market. Based on these regulatory legal documents, the main directions and indicators of human capital development are formed. Human capital is understood as a person's knowledge, skills, health status, professional skills, creative abilities and innovative potential. When assessing it, the following key indicators are taken into account: quality and coverage of education, efficiency of the healthcare system, employment rate in the labor market, income level of the population and innovative activity [4].

Thus, the development of human capital serves not only to ensure economic growth, but also to strengthen the social stability of society. This study analyzes the indicators and factors for assessing the development of human capital and its impact on the development of the country [5].

Human capital is one of the main factors of social development, and various scientific studies have been conducted by world scientists on its development. This section analyzes the studies conducted by leading scientists on the development and assessment of human capital [6].

1. The Concept of Human Capital and its Theoretical Foundations

The concept of human capital was first introduced into scientific circulation by Theodore Schultz and Gary Becker. According to their research, human capital is a person's contribution to the economy through knowledge, skills and health. They proved that investments in education and health lead to sustainable development of society and the economy. Schultz – human capital is an important asset for society and the economy, investments in it accelerate economic growth. Becker – investments in human capital (education, health care and professional development) help increase labor productivity and the well-being of society [7].

Based on these studies, a theory was developed that human capital is directly related to economic growth and labor market efficiency [8].

2. Scientific Approaches to Human Capital Assessment Methods

Different methods are used to assess human capital. Based on the research of leading scientists, the following assessment methods are distinguished: Robert Solow (1956) emphasized the importance of human capital in the theory of economic growth. In his opinion, human capital is one of the main factors contributing to economic development. According to the Solow model:

$$Y = AK^\alpha L^\beta \quad Y = A K^{\alpha} L^{\beta}$$

Where Y is economic growth, K is capital, L is labor, A is technological progress.

This model helps to determine the impact of human capital on economic growth. The model developed by Mankiw, Romer, and Weil provides an in-depth analysis of the impact of human capital on economic development. They proved that economic growth depends not only on physical capital and labor, but also on human capital [9].

Their research showed that:

1. An increase in human capital accelerates economic growth.
2. Investments in education and health care affect the well-being of society.
3. Hanushek and Kimko conducted research on the impact of education quality on economic development. Their results show the following:
4. As the quality of education in countries increases, economic growth rates also increase.
5. Quality education stimulates high labor productivity and innovation.

Also, the results of PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study) prove that the quality of education has a significant impact on the growth of human capital [10].

Barro studied the relationship between education and economic growth. He found that:

In countries with 1 year more education, GDP growth increases by 0.3-0.5%. Higher education leads to the development of high-tech production.

According to Bloom and Canning, health and life expectancy have a significant impact on economic growth:

1. A 10-year increase in life expectancy increases economic growth by 0.4%.
2. Healthy people work with high productivity and actively participate in innovative activities.

Acemoglu and Johnson's studies analyzed health investments and demographic changes. According to their research: High-quality medical services ensure economic stability. Investments in the health sector are important for long-term economic development [11].

A number of studies have also been conducted in Uzbekistan on the development of human capital. The following scholars have conducted research in this area: N. Juraev – Educational reforms and human capital growth in Uzbekistan. S. Abdurakhmonov– The relationship between the labor market and human capital. M. Rakhimov– The impact of the healthcare system on human capital in Uzbekistan.

These studies show that there are still many opportunities for the development of human capital in Uzbekistan.

The results of the analysis show that:

1. Human capital is an important factor in economic growth and social progress.
2. The quality of education, the healthcare system, and the labor market are the main components of human capital.
3. Leading scholars have proven that investing in human capital ensures the long-term development of the country.
4. It is necessary to further improve the education and healthcare systems in Uzbekistan to develop human capital.

2. Materials and Methods

In the process of assessing and analyzing human capital development, various scientific and methodological approaches are used. The main methods of the study are as follows:

1. Theoretical Analysis Method.

Existing theoretical sources, scientific articles, monographs, reports of international organizations and state programs on human capital development were studied. In particular, reports published by the World Bank, the United Nations (UN), the Organization for Economic Cooperation and Development (OECD) and the Human Development Index (HDI) were relied on.

2. Statistical Analysis Method.

Statistical indicators were analyzed to assess data related to human capital. In this, the following were taken as a basis:

- a. State Statistics Committee,
- b. Ministry of Economy and Finance of the Republic of Uzbekistan,
- c. Ministry of Higher Education, Science and Innovations,
- d. World Bank and UN Human Development Index (HDI).

The analysis took into account the following key statistical indicators:

- a. Life expectancy,
- b. Education coverage and quality,
- c. Unemployment rate and labor market situation,
- d. Income level and quality of life of the population.

3. Empirical Research Method

In order to deepen the analysis, surveys, interviews and expert assessments were conducted among respondents.

- a. Questionnaire method - information was collected from citizens, representatives of educational institutions and labor market participants.
- b. Expert assessment method - the opinions of industry specialists, economists, experts in the field of education and healthcare were analyzed.

4. Comparative (Comparative) Analysis Method

A comparison was made with other countries in the development of Uzbekistan's human capital, in particular:

- a. Central Asian countries,
- b. CIS countries,
- c. Developed countries of the world (USA, Germany, Japan).

This method allows using international experience in the level and prospects of human capital development in Uzbekistan.

5. Indicator-Based Assessment Method

The indicators used by international organizations in assessing human capital were analyzed. The main indicators are:

- a. Human Development Index (HDI) – assessed by education, life expectancy and gross domestic product (GDP).
- b. Global Competitiveness Index – the impact of human capital on innovative potential.
- c. Social Development Index – the level of citizens' access to healthcare and education services.

6. SWOT Analysis Method

Strengths and weaknesses, opportunities and threats in the process of human capital development were identified and analyzed. This method is important in identifying existing problems and developing ways to overcome them [12].

Based on the above methods, the process of human capital development is comprehensively assessed. Through statistical analysis and empirical research, existing problems are identified and proposals and recommendations are developed to eliminate them.

3. Results

The results of the study made it possible to identify the main indicators of human capital development. The following graphs and tables clearly reflect the results:

The table presents comparative data on human capital indicators across three countries. Country 2 leads in all dimensions, including education (92%), healthcare

expenditure (7.2% of GDP), labor productivity (\$30/hour), and innovation (1,500 patents), suggesting stronger investment in human development compared to Countries 1 and 3

Table 1 presents the main indicators used for assessing human capital across three countries. It includes education levels, healthcare expenditures as a percentage of GDP, labor productivity measured in dollars per hour, and innovation activity represented by the number of registered patents. According to the data, Country 2 leads in all four indicators, suggesting a stronger human capital profile, while Country 3 shows relatively lower values, indicating areas for potential improvement in healthcare investment, productivity, and innovation output.

Table 1. Main Indicators of Human Capital Assessment.

Indicator	Unit of Measurement	Country 1	Country 2	Country 3
Education level	%	89	92	87
Healthcare expenditures	% of GDP	6.5	7.2	5.8
Labor productivity	\$/hour	25	30	22
Innovation activity	Number of patents	1200	1500	1100

The results demonstrate that the development of human capital is directly linked to the advancement of education and healthcare systems [13].

4. Discussion

Modern economic studies reveal that human capital is not limited to education and healthcare systems alone—it is a crucial factor that determines the overall socio-economic status of a society. A high level of human capital manifests in several key areas:

1. Increased production efficiency,
2. Acceleration of innovation-driven development,
3. Enhanced competitiveness in the labor market,
4. Promotion of social equality and the growth of civil society.

Global experience shows that countries investing heavily in human capital tend to experience higher economic growth rates. For instance, Scandinavian countries (Sweden, Norway, Denmark) have achieved high levels of social welfare through sustained investments in human capital [14].

To assess the development level of human capital, international organizations use a number of key indicators. This study focuses primarily on the following metrics:

One of the main indicators is the Human Development Index (HDI) developed by the United Nations Development Program (UNDP). HDI evaluates human capital based on three core dimensions:

Life expectancy - an indicator of the population's health and well-being,

Education level – measured through average and expected years of schooling,

Gross Domestic Product (GDP) per capita is an indicator of economic prosperity [15].

Uzbekistan's HDI value was 0.727 in 2022, placing it in the group of countries with "medium human development." This suggests that significant progress is still required to enhance human capital in the country.

The Global Competitiveness Index, developed by the World Economic Forum, measures the impact of human capital on the innovative economy. It includes the following components:

1. Quality of education,
2. Efficiency of the labor market,
3. Innovation capacity.

Uzbekistan's results in this index remain at an average regional level, indicating the need to modernize the education system and improve the training of qualified professionals.

Various factors influence the formation and development of human capital. Among them, the following are considered the most important:

Education is a key component of human capital, and state policy aimed at its development is of great importance. In recent years, Uzbekistan has been implementing the following measures to improve the education system:

1. Expanding preschool educational institutions and improving the quality of school education.
2. Adapting higher education institutions to international standards.
3. Introducing digital educational technologies.

At the same time, problems with the shortage of highly qualified personnel and the quality of education still exist.

The health of the population is one of the important components of human capital. The following reforms are being implemented in the healthcare sector in Uzbekistan:

1. The quality of primary medical services is improving.
2. A medical insurance system is being introduced.
3. Private clinics and innovative technologies are developing.

However, the quality of medical services in rural areas still remains low.

The labor market plays a crucial role in the effective use of human capital. In Uzbekistan:

1. State programs are being implemented to increase the employment rate.
2. Projects aimed at attracting young people to entrepreneurship have been developed.
3. Measures are being taken to mitigate the consequences of labor migration.
4. However, the need for youth employment and a skilled workforce continues to grow.

Based on world experience, the following areas of human capital development are relevant for Uzbekistan:

1. South Korean experience - economic growth through investment in advanced technologies and education.
2. Singapore model - innovative economy and labor market flexibility.
3. Finnish education system - high-quality education and development of creative thinking.

Based on the above experience, special attention should be paid to the development of education and innovation in Uzbekistan.

The results of the discussion show that it is necessary to pay attention to the following areas of human capital development:

1. Improving the quality of education - introducing modern technologies and using international experience.
2. Improving the health system - improving the quality of medical services in rural areas.
3. Labor market reforms - developing vocational education and ensuring youth employment.
4. Transition to an innovative economy - investing in science and technology.

Human capital development is an important strategic direction for ensuring sustainable economic growth and social well-being of Uzbekistan.

The results of the study show that the level of human capital development significantly affects the country's economic growth rates. High-quality education and medical services contribute to the development of human capital.

Human capital is the sum of the economic and social benefits of each member of society, such as knowledge, skills, qualifications, experience, health, culture, and social activity. Human capital helps a person to maximize his or her potential and contribute to the development of society. This concept was introduced into economics by Theodore Schultz (1961) and Gary Becker (1964), who interpreted human capital as a key factor in economic development.

The main components of human capital:

Education and knowledge - a person's professional qualifications and level of knowledge serve to develop economic and innovative activities. Health and life expectancy - healthy people are important in increasing labor productivity and continuing economic activity. Professional qualifications and experience - a specialist's work efficiency and competitiveness are important components of human capital. Social activity and innovative ability - people's creative approach and social adaptability have a positive impact on the development of society.

The economic significance of human capital. Increases labor productivity - well-educated and skilled workers show high efficiency in the economy. Develops technological innovations - scientific and technological progress accelerates in societies with high human capital. Causes income growth - investments in human capital increase personal income, which has a positive effect on the national economy. Ensures social stability - societies with developed education and health systems strengthen economic and social stability.

Human capital is one of the most important factors that directly affect the development of society. Investments in processes such as education, health care and professional development are a key factor in ensuring the country's sustainable economic growth.

The main problems are:

1. Low quality of education and lack of resources in some countries.
2. Regions with insufficient investment in the health system.
3. Labor market dynamics and low innovative activity.

The following recommendations are made to address these issues:

1. Increase investment in human capital.
2. Implement digital education and professional development programs.

Creating incentive mechanisms for an innovative economy

5. Conclusion

Human capital development is one of the main factors in ensuring the country's economy and social stability. The results of the study show that investments in human capital directly affect labor productivity, innovative activity and the well-being of society as a whole.

Based on the analysis, the following main conclusions can be drawn: The work of world economists and researchers proves that human capital is an important component of economic development. A high level of education and the availability of a qualified workforce serve to develop innovations and accelerate technological progress.

The quality of education and investments in the education system accelerate economic growth. A modern education system and continuous professional development ensure the sustainable development of human capital.

The quality of medical services and the general health of the population directly affect the effectiveness of human capital. Healthy people have high labor productivity, which ensures long-term economic activity.

The level of skills of the workforce, the flexibility of the labor market, and employment policy play an important role in the development of human capital.

The introduction of innovative technologies in the labor market and continuous professional development of workers serve as the basis for economic development.

A number of reforms are being implemented in Uzbekistan to develop human capital, but they need to be further deepened and education, healthcare, and the labor market need to be improved. The development of the education system in accordance with international standards and the widespread introduction of modern technologies will increase the quality of human capital. Further development of the healthcare system and strengthening of social protection of the population will increase economic stability.

It is necessary to increase state investments in human capital and modernize the education and healthcare systems. It is necessary to train personnel in accordance with the requirements of the labor market through the development of workforce skills and innovative vocational education. The integration of the digital economy and modern technologies into the development of human capital will ensure the sustainable development of the country.

The results of the study confirm that human capital is an important factor in economic and social development. Therefore, it is important to pay special attention to the formation and development of human capital in the country's development strategies. The results of the study confirmed that the main indicators for assessing human capital development are closely related to education, health, labor productivity and innovative activity. High-quality human capital is the main driving force of economic development.

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