CENTRAL ASIAN JOURNAL OF INNOVATIONS ON TOURISM MANAGEMENT AND FINANCE

https://cajitmf.centralasianstudies.org/index.php/CAJITMF

Volume: 06 Issue: 04 | October 2025 ISSN: 2660-454X

Article

Priority Directions for Improving the Quality of Human Capital in the Republic of Uzbekistan

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Abstract: The article discusses priority areas for improving the quality of human capital in the Republic of Uzbekistan in the context of the formation of an innovative economy. The dynamics of the human capital index (HDI) and the human capital index (HCI) are analyzed, key factors influencing the growth of the quality of human capital are identified. Particular attention is paid to the development of higher education, the integration of science and industry, the digital transformation of educational programs and the creation of a single digital platform for monitoring human capital. The paper proposes alternative scenarios and forecasts for Uzbekistan until 2030 in the basic, pessimistic and optimistic versions. A conclusion is made about the need for accelerated improvement of the quality of human capital to strengthen the country's competitiveness and reach the level of international standards.

Keywords: Human Capital, Innovative Economy, Digitalization, Human Development Index (HDI), Human Capital Index (HCI), Education, Healthcare, Sustainable Growth

Citation: Bahodirovna, M. U. Priority Directions for Improving the Quality of Human Capital in the Republic of Uzbekistan. Central Asian Journal of Innovations on Tourism Management and Finance 2025, 6(4), 1500-1508.

Received: 30th Jul 2025
Revised: 07th Aug 2025
Accepted: 22nd Aug 2025
Published: 7th Sept 2025

1. Introduction

A modern innovative economy requires not only high technologies, but also the development of human capital, which is the main source of the state's competitiveness. The quality of human capital is determined by the level of education, professional training, health of the population, social activity and the ability to adapt to rapid changes. In accordance with the Decree of the President of the Republic of Uzbekistan No. UP-158 dated September 11, 2023 "On the Strategy" Uzbekistan-2030 ", one of the key tasks of national development is to improve the quality of human capital through investments in education, healthcare and the digital economy [1], [2].

The relevance of the study is due to the need to find effective tools to improve the quality of human capital in developing countries, including the Republic of Uzbekistan. This will ensure sustainable development and successful integration into the global innovation system [3], [4], [5].

2. Materials and Methods

The work uses an interdisciplinary approach, including:

a. Analysis of statistical data from international organizations (UN, World Bank);
b. Comparative analysis of foreign experience in the development of human capital and the Republic of Uzbekistan;

c. A systematic approach to identifying key factors influencing the quality of human capital;
d. A method of expert assessments for identifying priority areas for modernization.

3. Results

The analysis allowed us to identify the following priority areas for improving the quality of human capital:

Development of the education system and continuous learning:

a. Modernization of educational programs taking into account digital transformation;
b. Stimulation of scientific research activity of students and young specialists;
c. Development of mechanisms for "lifelong learning" (lifelong learning).

Supporting public health:

a. Expansion of preventive programs and availability of medical services;
b. Formation of a healthy lifestyle culture;
c. Development of digital medicine [6], [7].

Investing in digital competencies and innovative thinking:

a. Introduction of digital technologies into the educational process;
b. Development of critical thinking skills, creativity and entrepreneurship;
c. Training of personnel for high-tech industries [8].

Formation of a favorable social environment:

a. Ensuring social mobility and equal access to opportunities;
b. Development of civil society institutions and support for youth initiatives.

Public-private partnership in human capital development:

a. Creation of joint educational and research programs;
b. Stimulating businesses to invest in personnel training;
c. Development of regional innovation clusters [9], [10].

4. Discussion

The quality of human capital grows with a synchronous improvement in the Human Development Index (HDI) and the Human Capital Index (HCI). If a country demonstrates growth in the HDI and HCI, it means that it not only creates conditions for human development, but also effectively transforms these conditions into economic productivity and innovative development [11]. In Uzbekistan's statistics, they show approximately the same dynamics of slow but sustainable growth [12].

The Human Development Index (HDI), calculated by the United Nations Development Programme, measures countries' achievements in three key areas: health, education and living standards. It reflects the basic conditions for the formation of human capital. The higher the index, the better the fundamental factors are developed. Improving the quality of human capital is directly related to the growth of the HDI: investments in education and healthcare improve the index indicators, and therefore strengthen the basis for innovative and sustainable development [13]. In 2017, Uzbekistan's HDI value was 0.713 and increased to 0.740 by 2023.

This means a gradual and sustainable improvement in the quality of human capital, expressed in an increase in life expectancy, education level and real income per capita. On average, the annual increase was about 0.004-0.007 points, which indicates positive shifts in social and economic policies [14].

However, the country fell in the ranking from 106th place in 2019 to 107th place by 2023. The ranking is formed not by absolute value, but by relative position among all countries. The main reasons for the shift by 1 position can be determined as:

a. Other countries grew faster. Even if Uzbekistan showed improvement, a number of comparable countries developed more dynamically, which influenced the shift in the ranking;
b. The effect of "competition" in a group of countries with a similar level of development. Uzbekistan is in the category of "high human development" (High Human Development). Here even small changes (0.001-0.005 points) can lead to jumps up or down by several places, see Figure 1.

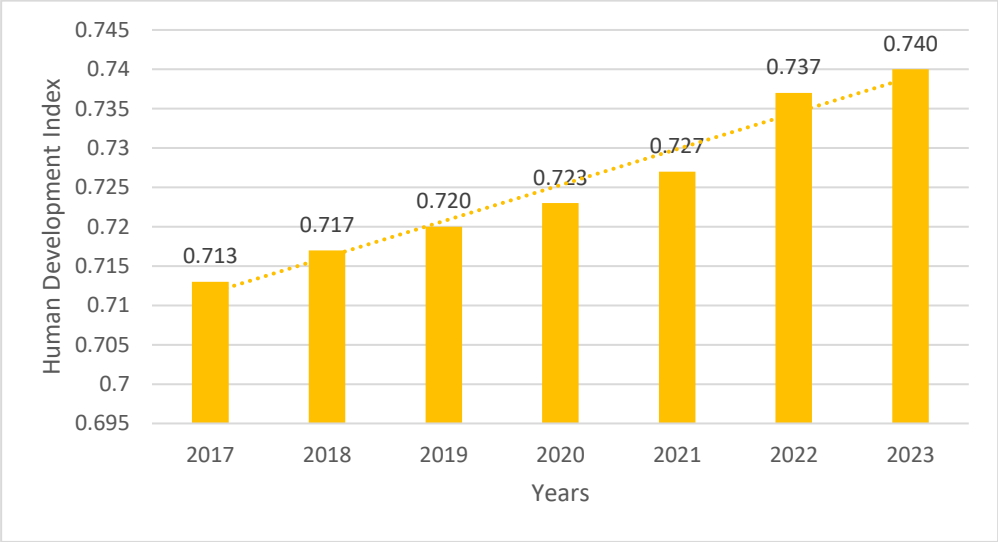

Figure 1. Human Development Index of Uzbekistan for 2017-2023.

This does not indicate regression, but rather suggests that Uzbekistan needs to accelerate the pace of improvement in order not only to grow in absolute terms, but also to strengthen its position in the ranking.

The World Bank's Human Capital Index measures how well a child born today can achieve his or her potential by age 18, given current levels of education and health. It includes the probability of a child's survival to age 5, expected years of schooling given the quality of education, and health status. The HCI focuses more narrowly on the productivity and potential of the workforce of the future. Its growth means that the population is becoming more educated, healthier, and able to create added value in an innovation economy [15].

The World Bank estimates that the overall human capital index for Uzbekistan, based on the 2020 World Bank report, was about 0.6. This means that today's child would be 60% as productive as an adult with full access to quality education and health care.

Among the CIS countries, Russia and Kazakhstan demonstrate relatively high indicators, reflecting the best state of the education, health care and general social protection systems. The quality of human capital in Uzbekistan is average for the CIS, but to become a leader, investments are needed in improving the quality of education, developing digital competencies and innovative thinking.

Higher education forms the core of competencies required for an innovative economy, digital transformation, and scientific and technological progress. In countries with a high level of human capital (> 0.8), the share of the population with higher education aged 25-34 reaches 50-60% (e.g. Canada, South Korea, Finland).

Thanks to the reforms carried out since 2017, higher education enrollment in Uzbekistan has increased from ~9% (2016) to over 30%, but is still below the OECD average (>50%). The quality of programs and research remains an issue - according to the QS and THE index , only a few universities in Uzbekistan are included in the world rankings. In

2025, 7 universities in Uzbekistan were included in the list, 5 of which were included in the ranking for the first time. Also, 12 universities in Uzbekistan entered the top 1000 of The Impact Times International Rankings 2025 Higher Education . Of these, 3 universities took positions in the 201-300 group, see Table 1.

Table 1. Higher Education Institutions of Uzbekistan in the QS World Rankings World University Rankings 2026.

Higher education institutions	QS World University Rankings 2026
National Research University "Tashkent Institute of Irrigation and Agricultural Mechanization Engineers"	469 (547 – 2025)
National University of Uzbekistan	721-730 (781-790 in 2025)
Tashkent State Technical University	901-950
Samarkand State University	1001-1200
Tashkent State University of Economics	1001-1200
Tashkent State Transport University	1201-1400
Tashkent University of Information Technologies	1401+

The key problems of the university system in Uzbekistan remain:

a. Limited research potential: low publication activity in international journals, insufficient laboratory facilities, R&D expenditures ~ 0.3% of GDP (the average level of OECD countries is 2.4%).
b. Low internationalization: the share of foreign students is < 5 %, academic mobility of teachers and students is limited.
c. Mismatch between graduate competencies and economic demands: shortage of specialists in green technologies, engineering, IT , STEM .
d. Limited autonomy: some higher education institutions are still limited in determining curricula, budget allocation and personnel policies.
e. Insufficient integration of science and business: weak involvement of business in the development of programs and funding of research.

In order to improve the quality of human capital in higher education in Uzbekistan, it is necessary to expand the autonomy of universities in choosing educational programs, hiring personnel and distributing funds with mandatory public reporting. For example, in Finland, universities have broad autonomy and are fully responsible for academic quality, budgets and strategic development. It is also advisable to introduce a system of institutional accreditation with independent quality assessment. Thus, in Kazakhstan, since 2019, universities have received academic autonomy and switched to external accreditation.

It is extremely important for Uzbekistan to implement the integration of education, science and industry. It is necessary to create industrial departments and laboratories on the basis of universities, introduce project-oriented training together with companies and create a system of public-private partnership in R & D. For example, in Germany, the connection of universities with industry through applied research (Fraunhofer Institutes). LINC + (Leaders) Program in Industry - University Cooperation) in South Korea finances joint projects between universities and companies.

Considering the foreign experience of Singapore and China, Uzbekistan needs to develop research universities by identifying national flagships with priority funding for research and international cooperation, introducing a grant system for young researchers, attracting foreign professors and postdoctoral fellows under fixed-term contracts. In Singapore, the National University and Nanyang Technological University actively

recruits foreign researchers, integrating with global scientific networks. Or the Chinese program " Double First Class » implements targeted funding to help universities reach the top of world rankings.

Using the example of the European Union Erasmus + program. The process of internationalization and academic mobility will enable Uzbekistan to launch a national program "Academic Mobility - 1000 +" for students and teachers, and create bilateral degree programs with foreign universities.

To finance and stimulate quality in Uzbekistan, it is necessary to move from fixed funding to the “money follows the student” model and additional grants for scientific publications, patents and employment of graduates. The introduction of tax incentives for companies investing in university research will provide an incentive for cooperation between companies and universities.

In the era of digitalization, it is necessary to introduce a national online course platform in Uzbekistan (similar to edX or OpenEdu), create a single digital ecosystem of universities with the integration of LMS , digital libraries and scientific databases.

The key tool for managing the quality of human capital is the creation of a single digital platform for monitoring human capital. It will have to solve the following tasks:

a. collection and integration of data on human capital (education, healthcare, labor market, innovation);
b. monitoring and analytics – dynamics of key indicators, forecasting;
c. decision making – providing data to the government, university , business, research institutes, see Figure 2.

The platform should include several blocks:

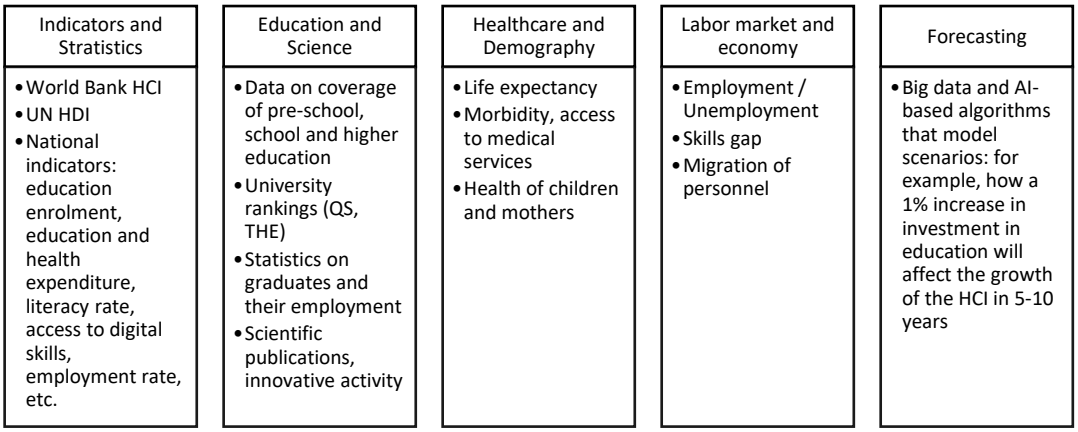

Figure 2. Elements of a unified digital platform for monitoring human capital.

The platform should have interactive maps (regional differences across the country), analytical reports (automatically generated in PDF/Excel), diagrams, heat maps and comparative analysis (e.g. with CIS countries, etc.). The platform participants are the government – for strategic planning, universities and research institutes – for scientific research; business – for assessing human resources potential, society – open data. Thus, this unified digital platform for monitoring human capital is not just a site with numbers, but an intelligent ecosystem of forecast data that will allow Uzbekistan to manage the quality of human capital at the level of international standards, see Figure 3.

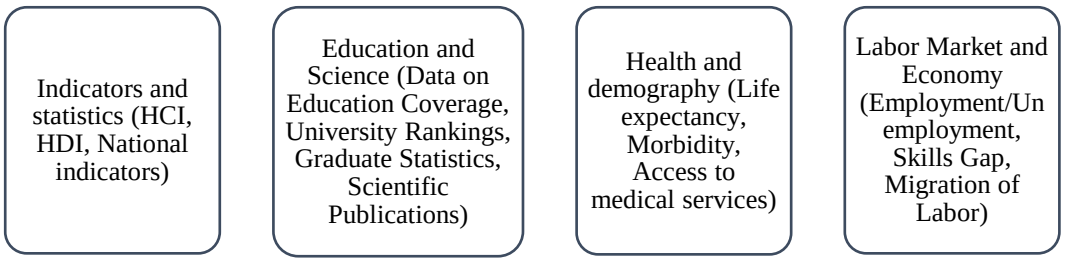

Figure 3. Layout of a unified digital platform for monitoring human capital of the Republic of Uzbekistan.

Improving the quality of human capital in an innovative economy is impossible without complex interaction between the state, business, educational institutions and society. The development of digital and creative skills, which are becoming the basic competencies of the 21st century, is of particular importance.

Uzbekistan is purposefully developing human capital through the Innovative Development Strategy, the main objective of which is the development and quality of human capital. The Uzbekistan 2030 Strategy places greater emphasis on education, healthcare, and private sector involvement. The volume of innovations has increased 12-fold over 10 years, the number of researchers is growing slowly, and there is a lag. The commercialization of science is insufficiently developed, the links between universities and industry are weak, and IP rights and technology transfer need to be strengthened.

Alternative scenarios for future development are proposed:

1. "Academic expansion" - improvement of education and science:

a. Expanding access to innovative education;
b. Increasing the number of universities with international participation;
c. Introduction of double degrees and specialized programs;
d. Emphasis on continuous education – professional courses, distance learning, improving the competence of adults.

In accordance with the Resolution of the President of the Republic of Uzbekistan “On additional measures to accelerate reforms in the field of education” No. PP-54 dated 02.02.2024, it is advisable “to create a Project Office “Center for Projects in the Field of Education” ... in order to increase human resources in the field of education ... raising the quality of educational services to the level of international standards and further accelerating reforms” .

2. "Competitive Talents" - development of human capital through international cooperation:

a. attracting schools, researchers and teachers from abroad;
b. bilateral educational programs;
c. scholarships, grants, return of talents.

3. "Smart economy" - integration of science and business:

a. strengthening technological transfer, commercialization, IP protection, stimulation of joint projects between science and industry;
b. reduced bureaucracy and accelerated patent process for foreign applications.

4. “Digital inclusion” – ensuring equal access and skills:

a. expansion of digital infrastructure, especially in the regions;
b. training of vulnerable groups and women in IT skills;
c. smart educational platforms, digital educational services, see Table 2.

Table 2. Scenarios for the development of human capital in the context of an innovative economy.

Scenario	Justification	Implementation measures
"Academic Expansion"	Raising the level of personnel; international quality	Creation of autonomous universities, exchange, development programs
"Competitive Talents"	Setting global standards	Scholarships, attracting teachers, bringing back talent
"Smart Economy"	Commercial potential of research	Transfer centers, IP improvement , clustering
"Digital Inclusion"	Equal access is the foundation of growth	Expanding IT accessibility, training vulnerable groups

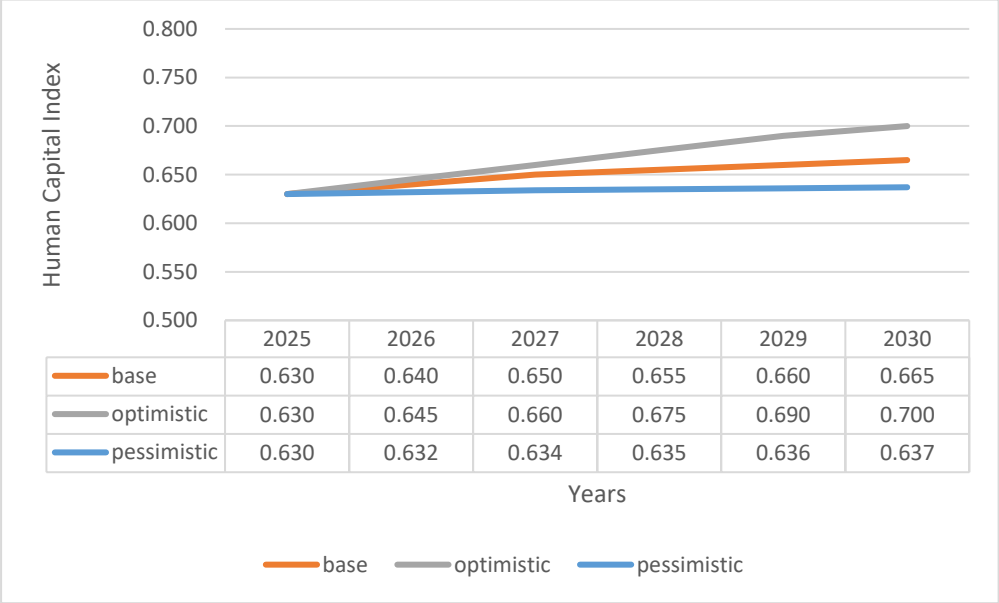

Figure 4. Alternative forecasts of human capital in Uzbekistan for 2025 – 2030.

As shown in Figure 4, the Human Development Index (HDI) for Uzbekistan improved from 0.713 in 2017 to 0.740 in 2023, reflecting gradual improvements in life expectancy, education level, and real income per capita. However, despite positive trends, Uzbekistan's rank decreased from 106th to 107th place due to faster growth in other countries within the same development group.

5. Conclusion

Uzbekistan has many tools for qualitative growth of human capital. Alternative scenarios shape strategic thinking and reveal the potential of education, science, entrepreneurship and international cooperation. Combining different approaches can ensure sustainable and inclusive growth in an innovative economy.

Concrete steps for Uzbekistan for 2025-2030:

By 2026:

a. Increase higher education coverage to 40%;
b. Launch 10 industrial departments in priority sectors (energy, mechanical engineering, agricultural technology, it);
c. Open 5 international joint double degree programs.

By 2030:

a. Increase the share of STEM graduates to at least 35% of the total graduation rate;

b. Entry of 2-3 universities into the Top 500 world rankings (QS / THE);
c. Increase the proportion of foreign students to approximately 10%;
d. Increase R&D spending to 1% of GDP.

The dynamics of the human capital index in Uzbekistan until 2030 will depend on the quality of reforms, investment activity and the level of international integration. Based on this, we can consider the basic, pessimistic and optimistic forecasts.

According to the pessimistic forecast, Uzbekistan's HCI will be ~0.637 by 2030. The growth of the quality of human capital is minimal, almost stagnation. Such a situation can be observed with insufficient investment in education and health care, the persistence of regional imbalances, the outflow of qualified personnel abroad, slow digitalization and weak implementation of innovations in the economy.

In the baseline forecast, human capital improves steadily but without breakthrough changes (~0.665 by 2030). This is achieved through gradual improvement of the education system through reforms, moderate growth in the availability of health services, expansion of digital infrastructure and digital skills training programs, maintaining stable economic growth and external investments in the social sphere.

In the optimistic forecast (~0.700 by 2030), human capital becomes the driver of an innovative economy, bringing Uzbekistan closer to the level of developed countries in terms of HCI. To achieve this result, large-scale investments in world-class education, improvement of the healthcare system and digital medicine, active development of the digital economy, start-up projects and innovative clusters, and strong state support in the field of social protection and equal access to opportunities are needed.

The quality of human capital in Uzbekistan demonstrates sustainable growth, but accelerated reforms in education, healthcare and digitalization are needed to reach the international level. The implementation of the proposed scenarios and measures will not only strengthen the social base, but also ensure the country's competitiveness in the context of the global innovation economy. At the same time, the state Strategy "Uzbekistan-2030" plays an important role, laying the foundation for the modernization of education, healthcare and science.

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