WAYS TO IMPROVE THE QUALITY OF HUMAN CAPITAL IN UZBEKISTAN

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Abstract: Human capital is a critical driver of economic growth and sustainable development. In Uzbekistan, despite recent reforms, challenges remain in education, healthcare, and labor market efficiency. This article examines key strategies to enhance human capital quality, focusing on education modernization, analyzing it with the help of econometric models in Stata, and labor market policies. By analyzing statistical data and successful international models, the study proposes actionable recommendations for policymakers.

Keywords: *Human capital, education reform, healthcare, labor market, educational policy, regression, correlation.*

O‘ZBEKISTONDA INSON KAPITALI SIFATINI YAXSHILASH YO‘LLARI

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Annotatsiya: Inson kapitali iqtisodiy o‘sish va barqaror rivojlanishning muhim omili hisoblanadi. O‘tkazilgan islohotlarga qaramay, O‘zbekistonda ta’lim, sog‘liqni saqlash va mehnat bozori samaradorligi sohalarida hamon muammolar mavjud. Ushbu maqolada inson kapitali sifatini oshirishning asosiy strategiyalari, jumladan, ta’limni modernizatsiya qilish (Statada ekonometrik modellardan foydalangan holda) va mehnat siyosatini takomillashtirish ko‘rib chiqiladi. Statistik ma’lumotlar tahlili va muvaffaqiyatli xalqaro amaliyot asosida davlat organlariga aniq tavsiyalar taklif etiladi.

Kalit so‘zlar: *Inson kapitali, ta’lim islohoti, sog‘liqni saqlash, mehnat bozori, ta’lim siyosati, regressiya, korrelyatsiya.*

ПУТИ ПОВЫШЕНИЯ КАЧЕСТВА ЧЕЛОВЕЧЕСКОГО КАПИТАЛА В УЗБЕКИСТАНЕ

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Аннотация: Человеческий капитал является ключевым фактором экономического роста и устойчивого развития. Несмотря на проводимые реформы, в Узбекистане сохраняются проблемы в сфере образования, здравоохранения и эффективности рынка труда. В данной статье рассматриваются основные стратегии повышения качества человеческого капитала, включая модернизацию образования (с применением эконометрических моделей в Stata) и совершенствование трудовой политики. На основе анализа статистических данных и успешных международных практик предлагаются конкретные рекомендации для государственных органов.

Ключевые слова: *человеческий капитал, реформа образования, здравоохранение, рынок труда, образовательная политика, регрессия, корреляция.*

INTRODUCTION

Nowadays human capital is one of the main parts of the whole economy and society. We know all around the world, day by day, human capital is increasing its importance in all parts of the country. Besides, human capital is getting the power to regulate the world, so many advanced countries are giving their full attention to educated humans. Like other countries, in our country we are trying to enhance the human capital in all parts, in terms of knowledge and health [1].

Human capital is a critical driver of economic growth, innovation, and sustainable development. In Uzbekistan, improving the quality of human capital—through education, healthcare, and skills development—is essential for enhancing productivity, competitiveness, and living standards [2]. Despite recent reforms in the education system and labor market policies, challenges such as skills mismatches, limited access to quality vocational training, and gaps in healthcare services persist. Strengthening human capital requires targeted investments in early childhood education, modernizing higher education, promoting lifelong learning, and ensuring better alignment between workforce skills and labor market demands. This paper explores key strategies to enhance human capital in Uzbekistan, focusing on policy measures, institutional reforms, and international best practices that can contribute to long-term economic and social progress.

In recent years, our country has implemented a number of measures to enhance human capital, with education reforms being the foremost priority. The Law of the Republic of Uzbekistan "On Education" (No. O‘RQ-637, dated August 23, 2020) introduced several provisions aimed at integrating the education sector with global

standards and increasing the value of human capital [3]. Specifically, drawing from the experience of developed countries, special emphasis was placed on improving education quality through new knowledge systems and advancing STEM education.

Furthermore, Presidential Decree No. PF-158 of August 11, 2023 [4], "On the 'Uzbekistan-2030' Strategy," outlines targeted plans and programs to elevate the education sector and enhance the value of human capital to a new level, reflecting the critical importance of the workforce in today's world.

In the modern era, science, technology, and innovation play a pivotal role in national development, and the significance of human capital in this process continues to grow. Therefore, one of the key objectives of the "Uzbekistan-2030" Strategy is to develop human capital by creating education, healthcare, and social protection systems that fully meet both population needs and international standards. An analysis of the measures implemented in 2023 under this strategy reveals significant steps taken by the government.

Education is a fundamental component of human capital, and the "Uzbekistan-2030" Strategy focuses on establishing an education system that aligns with global standards, fosters creative thinking, and enhances professional skills. For instance, public-private partnerships have facilitated bank loans for private sector representatives with property collateral rights, as well as opportunities to establish preschool institutions in multi-story buildings or private residences. These measures have positively impacted the growth of preschool institutions, with their number reaching 33,942 and the enrollment rate of children aged 3-7 increasing to 74.0%.

LITERATURE REVIEW

The theoretical and practical foundations of human capital development factor in the implementation of socio-economic development concepts and strategies and are primarily focused on advancing human capital through reforms in science and education. State-mandated reforms emphasize the development of education and upbringing, promoting healthy lifestyles, and advancing science and innovation.

The strategy of honoring human dignity is a pivotal event shaping our nation's prosperity and future prospects. Developing intellectual potential is among today's critical tasks, as highlighted in scientific articles by scholars such as Abdurakhmanov [2], Usmonov [5], and Rizaev et al. [6], who provide well-founded definitions and analyses on the evolving nature of human capital.

In the monograph titled "Human Capital as the Key Factor in Forming an Innovative Economy," Ubaydullaev [7] extensively examines the processes of developing scientific conclusions and practical recommendations under the conditions of an innovative economy, emphasizing the effective use of modern knowledge and digital economic technologies. The study highlights the prospects of digital economy

development amid growing human capital, proper utilization of information and communication technologies, and evidence-based recommendations for societal well-being and digital economic progress.

Scientific literature also explores the role of human capital in the innovative development of economic systems. Scholars such as Okunkova [8] and Golubkin et al. [9] discuss intellectual capital in the era of globalized economies, emphasizing that the combination of opportunities and risks in human capital development must be fully reflected in its key components, particularly education. They argue that the formation of an innovation-driven economy and the adoption of new technologies in the region are inherently dependent on human capital. Investments in human capital contribute to the advancement of civilizations and nations worldwide, enhancing labor productivity, production efficiency, and generating effective employment—a perspective supported by well-reasoned scientific definitions.

This body of work collectively underscores that human capital is not merely an economic asset but a fundamental driver of sustainable development, innovation, and societal progress.

METHODOLOGY

The purpose of the research is to study the theoretical and practical foundations of the factors of human capital development in Uzbekistan. Analysis of practical work aimed at increasing science, education, health, and culture for the development of human capital in New Uzbekistan and development actions of civilizations and countries of the world. In the process of human capital formation in the interests of innovative development, research on the problems and solutions to the formation of human capital, knowledge, skills, abilities, motivation, professional guidance, training of new information holders, formation of social demand, and human capital development has been studied; regulatory legal acts have been studied; and conclusions and proposals have been developed. It also aims to analyze higher education, which is the basis of human capital, and its current and future in terms of econometric statistics.

DISCUSSION AND RESULTS

Chapter IV of the Decree of the President of the Republic of Uzbekistan "On the Development Strategy of New Uzbekistan for 2022-2026" [10] is aimed at "pursuing a fair social policy, developing human capital" and includes the following development strategies aimed at 34 goals.

Provision of opportunities for every citizen to receive an exact vocational training at the expense of the state. Doubling the scale of vocational training to bring 1 million unemployed citizens to vocational training with 30% of the participation of non-state educational institutions in the process. Increase the level of coverage in preschool education from the current 70% to at least 80%, including bringing the level

of coverage of 6-year-olds with the preschool system to 100% by the end of the 2024/2025 school year. Creation of more than 7,000 new non-governmental preschool education organizations by attracting private sector funds to the preschool education system. In addition, the "Favorable Environment for Education" program is implemented in the general secondary education system. As a result, starting from the 2023/2024 academic year, 500,000 new facilities will be created annually, bringing the number of educational places to 7.5 million. 2.5 billion dollars to build schools with 8 million pupils is allocated.

Advanced training of over 160 thousand teaching staff in 2022-2016. Ensuring the targeted and effective use of budget funds in the preschool education system and transparent implementation of their financial process. Development and implementation of a national program to build new schools, increase the number of private schools, and improve the quality of education. Increase the number of training places to 6.4 million by the end of 2026. Increase their share by 8% in 2026, including 5% in 2024, by expanding facilities and opportunities for non-governmental educational service providers. Comprehensive revision and implementation of curricula and textbooks based on foreign best practices until 2026. step-by-step increase in the salary of qualified teachers to the equivalent of $1,000.

To enhance human capital in Uzbekistan, the following aspects should be prioritized.

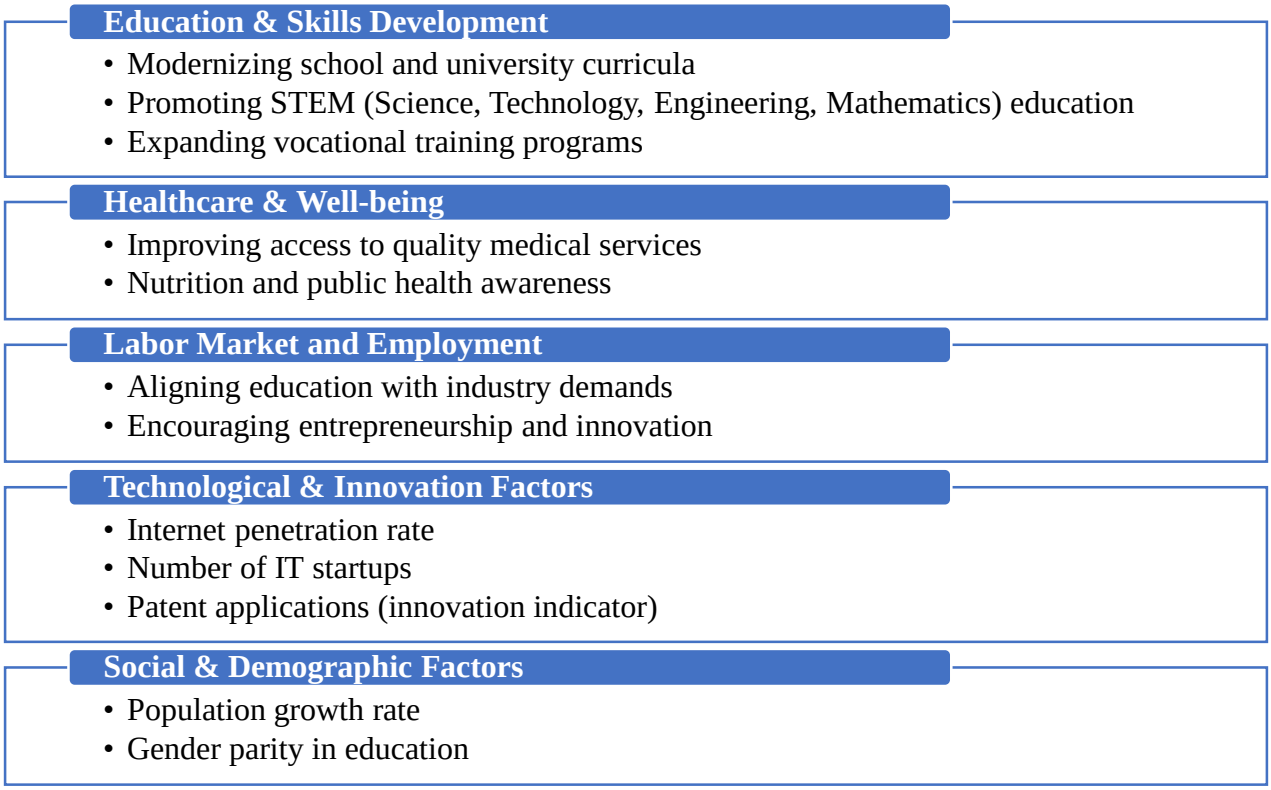

Figure 1. Main aspects to enhance the human capital in Uzbekistan

In this case, as the main object of research of this article, it is tried to develop proposals and conclusions on increasing human capital by studying the impact of students studying in modern higher education institutions on GDP.

As you know, human capital is mainly reflected in GDP, which is why, like any other industry, efforts are being made to increase the share of human capital in GDP [11]. This, in turn, shows that a number of challenges must be overcome.

In the aim of the study, we chose the Human Capital Indicator (e.g., Labor Productivity) as the Y factor to analyze the current state of human capital in our country. As X factors, we selected population, unemployment rate, higher education graduates, GDP, increase in technology, investment in fixed capital, and private continent. All of them serve to improve human capital, albeit partially [12]. Therefore, we tried to analyze all indicators from an econometric statistical point of view, select the main indicators, and develop proposals and feedback by selecting the factors that really affect the increase of human capital. In the following table you can see the Y and X factors.

Table 1

Y and X factors that can affect the human capital

Year	Human capital	Population	Population Revenue	GDP	Illegal Economy	Hidden Economy	Students in higher education	Investment
2016	18276,1	31575,3	197962,4	255421	0	0	66290	44810,4
2017	18488,9	32120,5	249346,3	356453	134788,6	25936,7	64133	51232
2018	18666,3	32656,7	313655,2	473652	162631,7	34042,5	67448	72155,2
2019	18829,6	33255,5	381387,9	594659	185205	46157,5	70325	124231,3
2020	18949	33905,2	431182,4	668038	206868,1	46309,4	70793	195927,3
2021	19158,2	34558,9	538450,7	820536	243544,9	62842	83905	210195,1
2022	19334,9	35271,3	654993,3	995573	271275,8	77529,3	103898	239552,6
2023	19517,5	36024,9	756084,2	1204485	320201,7	98703,7	102381	266240
2024	19739,6	36799,8	896274,4	1454573	383643,7	122006,5	184133	356071,4

Here’s a detailed analysis of the provided dataset, covering trends, relationships, and key insights across the variables from 2016 to 2024. This dataset paints a picture

of rapid economic expansion driven by investment but with rising structural challenges (shadow economies, human capital inefficiencies). Addressing these could ensure long-term stability [13].

Variable	2016	2024	Total growth
GDP	255,421.9	1,454,573.9	+469%
Investment:	44,810.4	356,071.4	+695%
Illegal Economy	0	383,643.7	Emerged
Higher education students:	66,290	184,133	+178%

These are the main points of the research.

The analysis process was primarily conducted using the Stata software, where we developed recommendations and insights by performing regression and correlation analyses. First and foremost, efforts were made to analyze the correlational relationships between these factors. The results of the correlation analysis can be seen in the second table.

Table 2

Matrix of correlations

V	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HC	1.000							
P	0.998	1.000						
PR	0.990	0.994	1.000					
GDP	0.990	0.993	0.999	1.000				
IE	0.974	0.962	0.949	0.955	1.000			
HE	0.988	0.985	0.988	0.992	0.980	1.000		
SHE	0.821	0.831	0.875	0.880	0.786	0.863	1.000	
I	0.978	0.985	0.978	0.977	0.931	0.958	0.852	1.000

This is a correlation matrix showing the relationships between the variables in your dataset. Each cell represents the Pearson correlation coefficient (r) between two variables, ranging from -1 (perfect negative correlation) to +1 (perfect positive correlation).

1. Extremely Strong Positive Correlations ($r > 0.95$)

Population (P) & Human Capital (HC): 0.998. Almost perfect correlation, suggesting human capital grows directly with population. Population Revenue (PR) & GDP: 0.999. Nearly identical trends, meaning GDP is highly dependent on revenue from the population (taxes, productivity?). Hidden Economy (HE) & GDP: 0.992. The hidden economy is almost perfectly tied to GDP growth—could indicate underreporting or informal sector expansion alongside formal growth.

2. Strong Positive Correlations ($0.90 \leq r \leq 0.95$)

Illegal Economy (IE) & GDP: 0.955. Suggests that as GDP grows, illegal activities (black market, corruption) also increase. Investment (I) & Population (P): 0.985. Investments rise almost proportionally with population growth.

3. Moderate Correlations ($0.80 \leq r < 0.90$). Students in Higher Education (SHE) & GDP: 0.880. Positive but not as strong—suggests education contributes to GDP but not as directly as investment or population. Investment (I) & SHE: 0.852.
Indicates that investment may support education, but not as strongly as other factors.

4. Weakest Correlation. Students in Higher Education (SHE) & Illegal Economy (IE): 0.786. The lowest correlation in the matrix, but still positive. Could imply that higher education slightly reduces illegal activity, but not strongly.

The regression analysis was conducted separately between the dependent variable (Y) and each independent variable (X) with the strongest influence, and an attempt was made to construct a linear regression equation for each relationship.

Firstly, we have tried to analyze the human capital and investment. You can see the regression analysis in the following table 3.

Table 3

Regression analysis of human capital and investment

HC	Coef.	St.Err.	t-value	p-value	[95% Conf.	Interval]	Sig
I	.004	0	12.50	0	.004	.005	***
Constant	18230.244	70.894	257.15	0	18062.606	18397.883	***

Mean dependent var	18995.567	SD dependent var	484.777
R-squared	0.957	Number of obs	9
F-test	156.319	Prob > F	0.000
Akaike crit. (AIC)	111.439	Bayesian crit. (BIC)	111.834

*** $p<.01$, ** $p<.05$, * $p<.1$

First, we should pay attention to the F-test statistics of the model. It should be less than 0.05; in our model it is equal to 0, which means our model has its effectiveness. The p-value of the investment is also equal to 0, so there is meaning to continue the regression model. R-squared means that this model opens 95% of this effectiveness. The final regression model we can write like this.

$$\mathbf{HC = 18230.24 + 0.004 * I}$$

This regression model means that if we increase the level of investment, the result will be an increase of 0.004 level. In other words, if we want to increase the human capital in Uzbekistan, we should increase the foreign direct investment.

Second, we have tried to analyze the human capital and GDP. You can see the regression analysis in the following table 4.

Table 4

Regression analysis of human capital and GDP

HC	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
GDP	.001	0	18.37	0	.001	.001	***
Constant	18084.103	55.394	326.46	0	17953.117	18215.09	***

Mean dependent var	18995.567	SD dependent var	484.777
R-squared	0.980	Number of obs	9
F-test	337.433	Prob > F	0.000
Akaike crit. (AIC)	104.723	Bayesian crit. (BIC)	105.118

*** *p<.01*, ** *p<.05*, * *p<.1*

As we can see from the above table, p-values are less than 0.05, which means our regression model has a meaning to continue. First, we should pay attention to the F-test statistics of the model. It should be less than 0.05; in our model it is equal to 0, which means our model has its effectiveness. The p-value of the GDP is also equal to 0, so there is meaning to continue the regression model. R-squared means that this model opens 98% of this effectiveness. The final regression model we can write like this [14].

HC = 18084.10 + 0.001 * GDP

This regression model means that if we increase the level of GDP, the result will be an increase of 0.001 level. In other words, if we want to increase the human capital in Uzbekistan, we should increase the GDP.

The next regression model contains the human capital and graduating students of higher education in Uzbekistan. We can see the regression model between them in the following table 5.

Table 5

Regression analysis of human capital and SHE

HC	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
SHE	.01	.003	3.81	.007	.004	.017	***
Constant	18056.621	265.734	67.95	0	17428.259	18684.982	***

Mean dependent var	18995.567	SD dependent var	484.777
R-squared	0.674	Number of obs	9
F-test	14.479	Prob > F	0.007
Akaike crit. (AIC)	129.697	Bayesian crit. (BIC)	130.091

*** p<.01, ** p<.05, * p<.1

As we can see from the above table, p-values are less than 0.05, and it is equal to 0.007, which means our regression model has a meaning to continue. First, we should pay attention to the F-test statistics of the model. It should be less than 0.05; in our model it is equal to 0.007, which means our model has its effectiveness. The p-value of the students on higher education is also equal to 0.007, so there is meaning to continue the regression model. R-squared means that this model opens 67% of this effectiveness. The final regression model we can write like this.

HC = 18056.62 + 0.01 * SHE

This regression model means that if we increase the level of SHE, the result will be an increase of 0.01 level. In other words, if we want to increase the human capital in Uzbekistan, we should increase the SHE.

CONCLUSION

This study examined the key factors influencing human capital development in Uzbekistan, utilizing econometric analysis (correlation and regression models) in Stata to identify the most significant drivers. The findings highlight several critical insights and policy implications for enhancing human capital in the country [15].

Investment and GDP are strong drivers of human capital. Regression analysis revealed that investment (I) and GDP growth have a statistically significant positive impact on human capital (HC). A 1-unit increase in investment leads to a 0.004-unit rise in HC, while a 1-unit increase in GDP contributes to a 0.001-unit increase in HC. These results suggest that economic expansion and capital inflows are essential for improving workforce skills and productivity.

Higher Education Enrollment Plays a Moderate Role. While students in higher education (SHE) positively affect human capital, the relationship is weaker compared to GDP and investment. A 1-unit increase in SHE results in a 0.01-unit increase in HC, but the model's explanatory power ($R^2 = 0.674$) indicates that other factors are also at play. This suggests that quality of education, curriculum relevance, and labor market alignment need further improvement.

Shadow Economies Pose Challenges. The illegal (IE) and hidden (HE) economies show strong correlations with GDP (0.955 and 0.992, respectively), indicating that informal economic activities grow alongside formal growth. This may

reflect tax evasion, underreported employment, or corruption, which could undermine human capital development if left unaddressed.

Population Growth Strongly Correlates with Human Capital

The near-perfect correlation between population (P) and HC (0.998) suggests that demographic expansion naturally increases human capital. However, without quality education, healthcare, and job creation, population growth alone may not translate into higher productivity.

Recommendations

- Increase Public and Private Investment in Education and Skills Training;
- Expand vocational training programs to reduce skills mismatches;
- Encourage private sector participation in higher education through PPPs (public-private partnerships);
- Enhance Higher Education Quality and Labor Market Alignment;
- Modernize curricula to emphasize STEM, digital literacy, and critical thinking;
- Strengthen university-industry collaborations to ensure graduates meet market demands;
- Combat Shadow Economies to Improve Formal Employment;
- Strengthen tax compliance and reduce informal employment through incentives;
- Improve transparency in economic reporting to better assess human capital contributions;
- Implement policies that convert population growth into a productive workforce, such as youth employment programs and lifelong learning initiatives.

Uzbekistan has made notable progress in human capital development, particularly through education reforms under the "Uzbekistan-2030" strategy. However, sustaining this progress requires targeted investments, better education quality, and formalization of the economy. By addressing these challenges, Uzbekistan can unlock its full human capital potential, fostering long-term economic growth and global competitiveness. This study underscores that human capital is not just a byproduct of economic growth but a fundamental driver of it. Strategic policy interventions can ensure that Uzbekistan’s workforce becomes a cornerstone of its development.

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