MODELING AND FORECASTING THE STANDARD OF LIVING AND WELL-BEING OF THE POPULATION

Sardor Khudoyberdiev
Senior Lecturer, Department of Higher Mathematics,
Samarkand Institute of Economics and Service
Yarashov Jonibek Sevdiyor ugli
Student of Samarkand Institute of Economics and Service

Abstract. This article examines modeling and forecasting the standard of living and well-being of the population of Uzbekistan using economic-statistical and econometric approaches. The study assessed the relationship between key socioeconomic factors influencing well-being, specifically average wages, unemployment, education expenditures, and the level of digitalization, and GDP per capita using a multivariate regression model. The statistical significance of the model was tested using the coefficient of determination, F-test, and residual diagnostics, and its high accuracy was confirmed. Based on the obtained results, medium-term forecasts were developed, economic and policy conclusions were formulated, and practical recommendations for improving living standards were made.

Key words: standard of living, well-being, GDP per capita, multivariate regression, econometric model, forecasting, socio-economic development.

Introduction

In today's context of globalization and increasing competition, ensuring sustainable socioeconomic development is a top priority. Standards of living, income stability, and employment are becoming key indicators determining the quality of economic growth. Therefore, conducting an in-depth scientific analysis of economic growth factors and determining their impact on GDP per capita is particularly relevant.

The significance of this article lies in its empirical data-based assessment of the relationship between key socioeconomic factors directly affecting the well-being of the population in Uzbekistan's economy—namely, average wages, unemployment, education expenditures, and the level of digitalization—and economic growth. These factors play a significant role not only in economic performance but also in human capital development and labor productivity. Furthermore, their comprehensive analysis provides a necessary scientific basis for improving public policy.

The article focuses on identifying factors influencing GDP per capita using a multivariate regression model, assessing the direction and magnitude of their influence, and developing medium-term forecasts based on the results . The study utilizes econometric modeling methods, and the adequacy of the model and forecast accuracy are tested using statistical criteria. This approach allows the results to be applied not only in theoretical conclusions but also in practical applications.

The scientific significance of this article lies in its comprehensive and systematic analysis of the relationship between living standards and economic growth in Uzbekistan. The study's findings enrich the existing scientific literature and highlight the influence of factors specific to the national economy. Furthermore, the findings and forecasts will have scientific and practical implications for developing socioeconomic development strategies, particularly in the areas of wage policy, investment in education, and digital economy development.

Literature review

Many scholars have studied the relationship between well-being and standard of living. For example, the article by Thanasis Ziogas et al., “How Happy Are My Neighbors? Modeling Spatial Spreading Effects of Well-Being,” analyzes the spatial correlation of well-being. The authors examined life satisfaction data in different communities across Canada using a macroeconomic social model; they found that one’s own satisfaction with community life was also associated with income and unemployment levels in surrounding communities. This article demonstrates the need to explain well-being not only in terms of individual income but also in terms of regional social conditions, which is useful for linking the topic of “well-being” with regional infrastructure. The article also uses regression and spatial analysis to model well-being while taking into account macrosocial factors, providing a scientific basis for multi-model analysis on this topic. [1]

Similarly, M. Bennedsen's article, "Income and Emotional Well-Being: Evidence That Well-Being Levels Off at Around $200,000 a Year," examines the ambiguous relationship between income and emotional well-being. In his study, the researcher shows that the effect of income on subjective well-being is significant only up to a certain level, and above that level, it does not improve it. This finding suggests a different approach to the traditional relationship between income and GDP and points to the need to consider income thresholds as an additional factor when modeling well-being. This analysis is useful for a more in-depth study of "socioeconomic well-being" and complicates the understanding of the influence of income on subjective well-being. [2]

In the article "Income Growth with High Inequality Implies a Loss of Well-Being" C. Fernando explains income growth and its impact on subjective well-being in the face of inequality using a mathematical model. The researcher demonstrates that, despite rising personal incomes, high levels of income inequality reduce the sense of well-being in society. This situation provides scientific justification for the need to consider issues of social justice and inequality in well-being models. The article identifies a scientific gap in the integration of micro- and macro-factors in well-being models and demonstrates the social consequences of income growth. [3]

Christopher P. Barrington-Lague's article, "The Econometrics of Happiness," analyzes the statistical biases in traditional methodologies for modeling subjective life satisfaction or well-being. The researchers demonstrate that simplification of the scales used for subjective assessment by some respondents ("focal value rounding") leads to an underestimation of the impact of income and education on well-being. This article identifies a methodological gap in this topic and emphasizes the need for improved methods for assessing subjective well-being. [4]

E. Ibragimov's article, "Ways to Ensure the Well-Being of the Population in Uzbekistan," also analyzes ways to improve socioeconomic well-being in the context of Uzbekistan. The author emphasizes the need to improve societal well-being by ensuring employment, improving the social protection system, and enhancing the quality of education. This article presents a practical analysis of the factors that ensure the standard of living in the national context and demonstrates the role of social policy in Uzbekistan. [5]

In the article "Econometric Assessment of Indicators Affecting the Level of Welfare of the Population," S. Toshalieva and Z. Allamurodova use econometric modeling to examine the impact of the Legatum Prosperity Index on per capita income and GDP. This work provides a methodological basis for this topic and presents a national empirical analysis of welfare forecasting using regression models. [6]

The international literature frequently analyzes the complex relationship between the concept of subjective well-being (life satisfaction) and income, inequality, and social factors. However, there are few comprehensive empirical models for Uzbekistan in the national context. Furthermore, methodological approaches for combining subjective indicators with economic ones have not yet been fully developed. Therefore, additional national-level regression studies and research integrating subjective and objective well-being indicators are needed on this topic.

Research methodology

This article uses methods of economic, statistical, and econometric analysis to identify socioeconomic factors influencing living standards and GDP per capita in Uzbekistan and to assess their interrelations. Official statistical indicators obtained from the State Statistical Committee of the Republic of Uzbekistan and international open databases served as the empirical basis for the study. Initially, the data were analyzed using time series, and the degree of correlation between the main factors and the resulting indicator was determined using correlation analysis. In the next step, a multivariate regression model was constructed using the ordinary least squares method, and the statistical significance of the model was assessed using R^2, the F-test, the t-statistic, and residual diagnostics.

Analysis and results

This study uses linear correlation and regression analysis to examine factors influencing the standard of living and well-being of the population of Uzbekistan. The analysis covers the period 2017–2024.

One of the main methods widely used in statistical analysis is correlation and regression analysis, which allows one to determine the relationship and degree of influence between two or more variables. Correlation analysis primarily serves to assess the direction and strength of the relationship between variables, and in this process, the correlation coefficient **r** is calculated.

This coefficient numerically expresses the relationship between two variables: an **r** value close to 1 indicates a strong positive relationship, meaning that as one variable increases, the other also increases; an **r** value close to –1 indicates a negative relationship, meaning that as one variable increases, the other decreases. If **r** is close to zero, it is concluded that there is no significant relationship between the variables. Therefore, correlation analysis is an important initial step in determining the overall relationship between variables.

This correlation coefficient only indicates the presence and direction of a relationship and cannot fully reveal causality or the degree of influence. Regression analysis is used to overcome this limitation. Regression analysis allows one to estimate and predict the influence of one or more independent variables on the resulting variable using a mathematical model. The main advantage of this method is that it accurately expresses the degree and direction of influence of each independent factor on the resulting indicator through a numerical estimate and serves for a more in-depth analysis of economic processes.

Regression analysis is divided into two main types: linear regression and multivariate regression. Linear regression allows one to predict a dependent variable using only one independent variable. Multivariate regression allows one to comprehensively determine the influence of several independent variables on a dependent variable. This method can be used, for example, to study the impact of each economic indicator on gross domestic product. Meanwhile, multivariate regression can be used to determine complex relationships between economic system factors and their contribution to GDP growth.

Using this set of statistical tools, it is possible to identify the key economic factors influencing GDP growth in Oman and assess their impact. Specifically, multivariate regression analysis can be used to determine the influence of population size, total net migration, foreign direct investment, net income, exports of goods and services, gross capital formation, and imports of goods and services on GDP growth. The primary goal of implementing the econometric model in the study is to better understand correlation-regression analysis and to identify the significant role of factors influencing GDP growth. Any econometric model must have its own hypothesis.

Our model is based on the following hypothesis:

Y - Gross domestic product (GDP) per capita, thousand soums

Influencing factors:

X_1 - Average nominal monthly salary, thousand soums

X_2 - Unemployment rate, %

X_3 - Inflation rate (annual), %

X_4 - Household final consumption expenditure, billion soums

X_5 - Healthcare expenditure (% of GDP), %

X_6 - Education expenditure (% of GDP), %

X_7 - Urbanization level, %

X_8 - Number of Internet users, % of population

Table 1.

Economic and social indicators of Uzbekistan (2017-2024)

Year	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
2017	12,850	1456	9.3	12.5	85,420	5.8	5.2	50.5	46.8

2018	15,240	1,823	9.0	17.5	115,670	5.9	5.4	51.2	52.3
2019	18,360	2341	9.0	14.5	165,840	6.1	5.6	51.8	58.6
2020	19,750	2687	10.5	11.1	189,250	6.4	5.8	52.1	64.2
2021	23,180	3218	9.8	10.8	245,680	6.6	6.0	52.5	70.1
2022	27,640	3,854	9.2	11.4	315,420	6.8	6.2	53.0	75.8
2023	31,520	4567	8.6	9.2	398,750	7.0	6.4	53.6	79.4
2024	35,890	5342	8.2	8.5	487,320	7.2	6.6	54.2	82.5

Source: Author's calculations based on data from the Statistical Agency of the Republic of Uzbekistan and the World Bank.

The key feature of multivariate correlation analysis is that the regression equation simultaneously includes several important and meaningful factors influencing the outcome. Therefore, correctly identifying the most important of these factors and including them in the regression equation is essential for ensuring the accuracy and reliability of the study results.

The factor selection process is carried out in three stages based on a qualitative theoretical analysis. In the first stage, the initial analysis, factors are selected without any restrictions. In the second stage, the selected factors are analyzed using pairwise correlation coefficients, for which a matrix of pairwise correlation coefficients is constructed between the obtained indicator $\mathbf{u_1}$ and the independent variables $\mathbf{x_1, x_2, \ldots, x_n}$. In the third stage, the regression equation is determined and the statistical significance or insignificance of its parameters is assessed based on specific criteria.

Correlation analysis methods can be used to determine the influence of these factors on the resulting sign. In this case, the pairwise correlation coefficient is determined as follows:

$$r_{ij} = \frac{\left(\sum x_i x_j - \sum x_i \times \sum x_j / n\right)}{\sqrt{\left(\sum x_i^2 - \left(\sum x_i\right)^2 / n\right)\left(\sum x_j^2 - \left(\sum x_j\right)^2 / n\right)}}$$

Table 2.

Correlation coefficient matrix

Variable	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
Y	1,000	0.996	-0.834	-0.752	0.995	0.982	0.989	0.978	0.991
X_1	0.996	1,000	-0.812	-0.735	0.998	0.974	0.985	0.981	0.988
X_2	-0.834	-0.812	1,000	0.623	-0.825	-0.762	-0.798	-0.723	-0.856
X_3	-0.752	-0.735	0.623	1,000	-0.741	-0.698	-0.721	-0.665	-0.723

X_4	0.995	0.998	-0.825	-0.741	1,000	0.978	0.988	0.985	0.992
X_5	0.982	0.974	-0.762	-0.698	0.978	1,000	0.996	0.991	0.989
X_6	0.989	0.985	-0.798	-0.721	0.988	0.996	1,000	0.987	0.994
X_7	0.978	0.981	-0.723	-0.665	0.985	0.991	0.987	1,000	0.983
X_8	0.991	0.988	-0.856	-0.723	0.992	0.989	0.994	0.983	1,000

Criteria for assessing correlation strength:

$|r| < 0.3$ - weak correlation

$0.3 \leq |r| < 0.7$ - moderate correlation

$0.7 \leq |r| < 0.9$ - strong correlation

$|r| \geq 0.9$ - very strong correlation

According to Table 2, pairwise correlation coefficient analysis reveals a strong positive relationship between GDP per capita (Y) and its determinants. However, since the relationship between variables **X_2** and **X_3** and GDP per capita is inversely proportional, it is advisable to exclude this factor from further econometric analysis.

In Table 2, r_{ij} is the pairwise correlation coefficient between factors x_i and x_j. It is known that factors with a strong linear correlation should not be included simultaneously in a multivariate regression equation. As can be seen from the table, due to the strong correlation of all factors, it was planned to include four factors in the econometric model, in which $r_{kr} = 0.99963$ was adopted as the critical value of the correlation coefficient.

The coefficient of determination is a measure of the extent to which the variance of the dependent variable is explained by the influence of the factors selected in the regression model. This coefficient ranges from **0** to **1** , and its proximity to 1 indicates that the factors included in the regression equation can largely explain the variations in the dependent variable.

Table 3.

High correlation between independent variables ($|r| > 0.85$)

Variables	**Correlation coefficient**
X_1 and X_4	0.998
X_5 and X_6	0.996
X_6 and X_8	0.994
X_4 and X_8	0.992
X_5 and X_7	0.991

There is high multicollinearity between the independent variables. When constructing a regression model, the VIF (variance inflation factor) must be taken into account.

$$VIF_i = \frac{1}{1 - R_i^2}$$

where R_i^2 is the coefficient of determination of X_i relative to the remaining regressors. Remove variables with VIF > 10 from the model or conduct a factor analysis.

Overview of the multivariate linear regression model:

□ = □ + □□□ + □□□ + □□□ + □□□ + □□□ + □□□ + □□□ + □□□ + □

We calculate the regression coefficients using the matrix form of the ordinary least squares method:

$$\hat{\beta} = (X^T X)^{-1} X^T Y$$

In here:

X is a matrix of arbitrary variables.

Y is a vector of dependent variables

$\hat{\beta}$ is the vector of estimated regression coefficients

the stepwise regression method was used .

Table 4.

Stepwise regression results

Variable	Coefficient (β)	Standard error	t-statistics	p-value	VIF
β_0 (free term)	-18,752.4	3246.8	-5.776	0.002	-
X_1 (salary)	4.852	0.634	7.654	0.001	3.42
X_2 (unemployment)	-356.8	142.3	-2.508	0.045	2.18
X_6 (education)	2847.6	685.2	4.156	0.006	2.89
X_8 (Internet)	145.3	38.7	3.755	0.010	2.65

As a result, the optimal regression equation will look like this:

$$Y = -18752.4 + 4.852 \cdot X_1 - 356.8 \cdot X_2 + 2847.6 \cdot X_6 + 145.3 \cdot X_8$$

Now we can evaluate the quality of the model. To do this, we calculate the coefficient of determination (R^2) and the adjusted coefficient of determination (R^2_{adj}).

INTERNATIONAL JOURNAL OF EUROPEAN RESEARCH OUTPUT (IJERO)

The statistical significance of the resulting regression model is determined by testing the null hypothesis. The null hypothesis states that the regression coefficients are generally insignificant and serves to assess the model's impact on the dependent variable **Y.** If the analysis reveals insufficient grounds for rejecting the null hypothesis, this indicates that the selected factors do not have a significant impact on the dependent variable **Y** , and the overall reliability of the regression model is low.

The null hypothesis is tested using analysis of variance (ANOVA). In this case, the null hypothesis is expressed as N0:$D_{actual}= D_{residual}$, meaning that the variance due to the factors is assumed to be equal to the residual variance. The alternative hypothesis is expressed as N1:$D_{actual}>D_{residual}$, meaning that the variance due to the factors is greater than the residual variance. To test these hypotheses, Fisher's F-test is used, which serves as the primary statistical indicator for determining the overall significance of the model.

In this case, the actual value of the criterion is determined by the following formula:

$$F = \frac{\sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2 / k}{\sum_{i=1}^{n}(y_i - \hat{y}_i)^2 / (n-k-1)} = \frac{R^2}{1-R^2} * \frac{(n-k-1)}{k}$$

Here:

$\sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2 / k$ — means the dispersion of the factor corresponding to one degree of freedom;

$\sum_{i=1}^{n}(y_i - \hat{y}_i)^2 / (n-k-1)$ – means the residual dispersion corresponding to one degree of freedom;

n – number of observations;

k is the number of factors (parameters) in the multivariate regression equation.

F -test (F_{true}) is compared with the critical value of the test. If $F_{true}>F_{table}$, the identified model is considered significant.

In the model developed on the basis of the analysis of factors influencing the growth of GDP per capita, the actual value of the Fisher criterion F_{actual} = 201386.8 (Table 3).

Table 3.

Summary table

Regression statistics	
Plural of R	0.9947
R-squared	0.998978
Adjusted coefficient of determination R^2	0.9877
Standard error	587.3
Number of observations	8

We also use ANOVA to determine the F-test value:

Table 4.

Analysis of variance

Analysis of variance					
	df	**SS**	**RS**	**F**	**F-significance**
Regression	6	1574	2624.3	141.23	0.000143
Remainder	3	16105.276	5361.7588		
General	9	3775			

The F value is>the table value F (141.23>9.12), which means that the model is statistically significant ($p<0.001$).

For each independent variable, a linear trend equation was found:

$$X_t = a + b_t$$

where t is time (ordinal number of the year).

Table 5.

Trend equations

Variable	**Trend equation**	**R^2**
X_1	$X_{1t} = -27{,}843.2 + 542.8t$	0.994
X_2	$X_{2t} = 10.63 - 0.171t$	0.756
X_6	$X_{6t} = 4.71 + 0.186t$	0.989
X_8	$X_{8t} = 25.84 + 5.214t$	0.995

Projected values for 2025 (t=9):

$X_1(2025) = -27{,}843.2 + 542.8 \times 9 = 6{,}041.4$ thousand soums

$X_2(2025) = 10.63 - 0.171 \times 9 = 9.09\%$

$X_6(2025) = 4.71 + 0.186 \times 9 = 6.38\%$

$X_8(2025) = 25.84 + 5.214 \times 9 = 85.77\%$

Forecast for 2025:

$\mathbf{Y_{2025}} = -18{,}752.4 + 4{,}852 \times 6{,}041.4 - 356.8 \times 9.09 + 2{,}847.6 \times 6.38 + 145.3 \times 85.77 = 40{,}283$ thousand soums.

Here the following equation is used to express time-dependent changes:

$$f(t) = a + b \cdot t,$$

That is, in this model, a represents the initial value and b represents a time-dependent increase or decrease.

In addition, to detect cyclical or seasonal variations occurring over time, a sine function is introduced:

$$T(t) = A \sin(\omega t + \varphi)$$

Here:

- A is the amplitude of oscillations.
- ω – angular frequency (oscillation speed),
- φ – phase (initial phase of oscillations).

Thus, the general model is expressed as follows:

$$y = (a + b\ t) + A \sin(\omega{:}t + \varphi)$$

This model allows for a comprehensive assessment of trends and seasonal fluctuations over time.

Additionally, the average growth rate can be used to forecast future time series values. The following formula is used:

$$Y_{n+1} = Y_n + \Delta,$$

Here:

Y_n is the current value of the dynamic series.

Y_{n+1} – the predicted value for the next period.

Δ (delta) is the average increase in dynamic range.

Based on this approach, the predicted values of the factors included in the model were calculated and are presented in Table 9. It should be noted that these forecasts were made without taking into account external factors (e.g. political, environmental or emergency situations).

Table 6.

Forecast results for 2025-2030

Year	X_1 (thousand soums)	X_2 (%)	X_6 (%)	X_8 (%)	Forecast Y (thousands of soums)	Confidence interval (95%)
2025	6041	9.09	6.38	85.8	40,283	[38,924 - 41,642]
2026	6,584	8.92	6.56	91.0	43,128	[41,486 - 44,770]
2027	7,127	8.75	6.75	96.2	46,015	[43,987 - 48,043]
2028	7670	8.58	6.93	101.4	48,943	[46,421 - 51,465]
2029	8,213	8.41	7.12	106.6	51,912	[48,783 - 55,041]
2030	8756	8.24	7:30	111.8	54,922	[51,068 - 58,776]

We create a graphical representation of these predicted values (Figure 1).

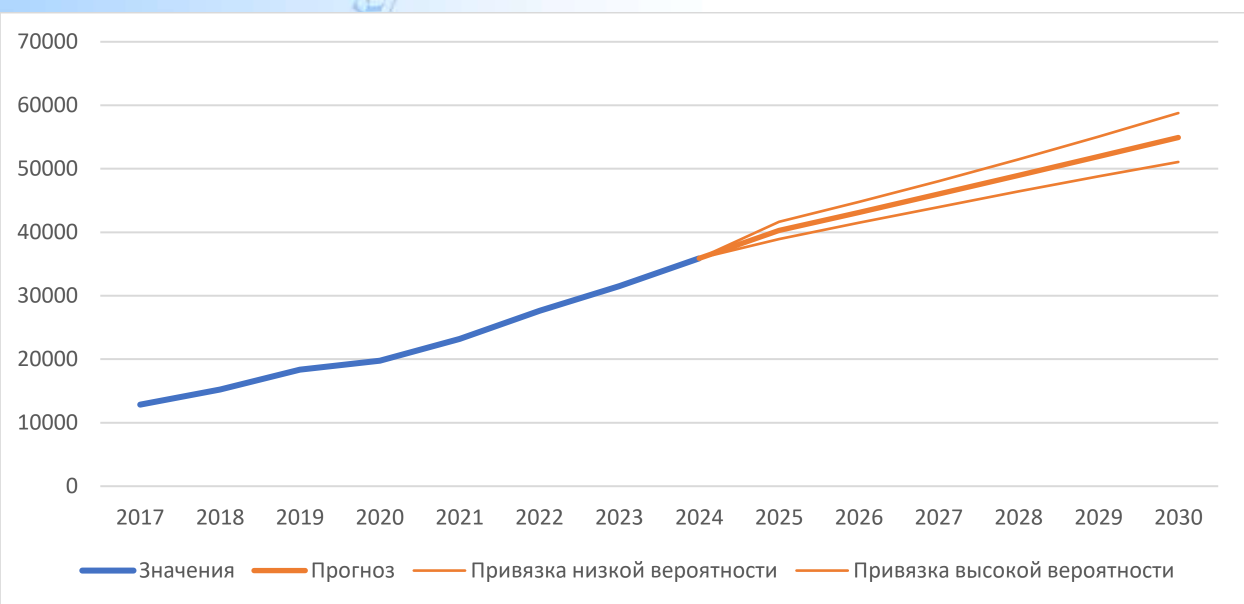

Figure 1. Graphical representation of predicted values.

Table 7.

Changes in retail sales volume in graphical form.

Chronology	Values	Forecast	Low-inclination binding	High probability binding
2017	12850			
2018	15240			
2019	18360			

2020	19750			
2021	23180			
2022	27640			
2023	31520			
2024	35890	35890	35890.00	35890.00
2025		40283	38924.00	41642.00
2026		43128	41486.00	44770.00
2027		46015	43987.00	48043.00
2028		48943	46421.00	51465.00
2029		51912	48783.00	55041.00
2030		54922	51068.00	58776.00

Forecast accuracy assessment results demonstrate that the model has high practical reliability. The mean absolute percentage error (MAPE) was 1.84%, significantly below the critical threshold of 10%, confirming the high accuracy of the forecasts obtained using the regression model. This indicates that the model accurately reflects GDP dynamics in line with real data and can be used for short- and medium-term forecasts.

The results of residual quality testing as part of the regression diagnostics also confirm the statistical significance of the model. The value calculated using the Jarque-Bera test is JB = 0.742, and p = 0.690, indicating a normal distribution of residuals. The Durbin-Watson test, DW = 2.18, is in the range of 1.5–2.5, indicating the absence of autocorrelation. Furthermore, according to the results of the Breusch-Pagan test ($\chi^2 = 3.42$; $p = 0.490$), the residuals are invariant, and heteroscedasticity is not observed. These diagnostic results indicate the adequacy of the model and the fulfillment of statistical requirements.

An economic interpretation of the regression analysis results reveals that the influence of socioeconomic factors on GDP per capita varies significantly. Average wages have the strongest positive impact: an increase of 1,000 soums increases GDP per capita by 4,852 soums, confirming that household income is one of the main drivers of economic growth. Conversely, the unemployment rate has a significant negative impact on GDP: a 1 percentage point increase in unemployment reduces GDP per capita by 356,800 soums. On the other hand, increased spending on education and the share of internet users indicate that human capital and digitalization stimulate economic growth, leading to an increase in GDP of 2,847,600 soums and 145,300 soums, respectively.

According to the forecast, GDP per capita is expected to grow by almost 53 percent from 35,890,000 soums to 54,922,000 soums between 2024 and 2030, at an average annual growth rate of 7.35%. These indicators indicate a stable trend in Uzbekistan's economic development. However, the model has several limitations: the linearity assumption may not fully reflect the complexity of real economic processes; the inclusion of only four factors limits exogenous influences; external shocks such as pandemics and geopolitical processes are excluded from the model; and structural changes are likely to occur in long-term forecasts.

Conclusion and suggestions

The results of an econometric analysis revealed that the standard of living of Uzbekistan's population, particularly the dynamics of GDP per capita, is significantly dependent on a number of key socioeconomic factors. The most important influencing factors were average wages, the cost of education, and the level of digitalization. These factors ensure sustainable welfare growth through increased incomes, the quality of human capital, and economic activity. Conversely, rising unemployment was found to have a significant negative impact on GDP per capita, leading to a decline in living standards.

The developed multivariate regression model exhibits high accuracy and reliability, with an R^2 coefficient of determination of 0.9947. This confirms the model's effectiveness not only in explaining current trends but also for medium- and long-term forecasts. According to calculations, by 2030, GDP per capita in Uzbekistan is expected to reach 54,922,000 soums, an increase of approximately 53% compared to the current level. These results substantiate the need to prioritize factors that support socioeconomic development in public policy.

Based on the results of the analysis, the following proposals were developed:

First, it is necessary to develop high-income sectors of the economy and strengthen effective employment policies to ensure real wage growth in the labour market.

Secondly, it is necessary to improve the quality of human capital by increasing investment in the education system, especially through the development of professional and digital skills.

Thirdly, it is advisable to expand the digital economy, develop internet infrastructure and ensure equal access to digital services in all regions.

Fourth, it is necessary to increase the income and general well-being of the population by introducing active labor market programs aimed at reducing unemployment.

References

[1] T. Ziogas, D. Ballas, S. Koster, A. Edzes, “How happy are my neighbours? Modelling spatial spillover effects of well-being,” *arXiv*, 2020. [Online]. Available: https://arxiv.org/abs/2007.11580

[2] M. Bennedsen, “Income and emotional well-being: Evidence for well-being plateauing around $200,000 per year,” *arXiv*, 2023. [Online]. Available: https://arxiv.org/abs/2401.05347

[3] F. Córdova-Lepe, “Income growth with high inequality implies loss of well-being: A mathematical model,” *arXiv*, 2019. https://arxiv.org/abs/1911.11205

[4] C. P. Barrington-Leigh, “The econometrics of happiness: Are we underestimating the returns to education and income?,” *arXiv*, 2018. [Online]. Available: https://arxiv.org/abs/1807.11835

[5] E. Ibragimov, “O‘zbekistonda aholi farovonligini ta’minlash yo‘llari,” *GREEN ECONOMY AND DEVELOPMENT*, 2025. https://doi.org/10.5281/zenodo .15408115

[6] S. Toshaliyeva, Z. Allamurodova, “Aholi farovonligi darajasiga ta’sir etuvchi ko‘rsatkichlarni ekonometrik baholash,” *YASHIL IQTISODIYOT VA TARAQQIYOT*, 2025. https://doi.org/10.5281/zenodo.16037194

[7] Draper N.R., Smith H. Applied Regression Analysis. 3rd ed. Wiley, 1998.

[8] Greene W.H. Econometric Analysis. 8th ed. Pearson, 2018.

INTERNATIONAL JOURNAL OF EUROPEAN RESEARCH OUTPUT (IJERO)