

American Journal of Economics and Business Management

Vol. 9 Issue 7 | **pp.** 55-60 | **ISSN:** 2576-5973
Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Econometric Modelling of The Scenario Forecast of The Socio-Economic Development of The Bukhara Region Up to 2030

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Abstract: The article addresses the forecasting of the socio-economic development of the Bukhara region for 2026–2030. The forecasting methodology combines multifactor econometric modelling and a scenario approach. Based on three scenarios (inertial, moderate and optimistic), a forecast of the gross regional product (GRP), investment, the unemployment rate and foreign-trade indicators was developed. Under the optimistic scenario, by 2030 the region's GRP is projected to reach 215.5 trillion soums (+148.8%), exports to reach 4,115.9 million USD, and the foreign-trade deficit to turn into a surplus of 178.5 million USD.

Keywords: scenario forecasting, econometric model, gross regional product, foreign-trade balance, unemployment, Uzbekistan – 2030 strategy, Bukhara region

1. Introduction

Reliable forecast indicators are an essential prerequisite for the strategic planning of regional development and for evidence-based decision-making. The Development Strategy of New Uzbekistan for 2022–2026 and the Uzbekistan – 2030 Strategy set the tasks of accelerating the development of regions and raising household incomes [1], [2]. For the Bukhara region, additional measures have been approved by a dedicated resolution [3], [4], [5].

According to the results of 2025, the GRP of the Bukhara region amounted to 86,608.1 billion soums, with a real growth rate of 7.2% [6]. At the same time, the foreign-trade deficit (–790.7 million USD) and the faster growth of imports relative to exports are among the factors that must be specifically taken into account in forecasting [7], [8], [9], [10].

The aim of the study is to forecast the socio-economic development of the Bukhara region up to 2030 by combining multifactor econometric modelling with a scenario approach, and to substantiate the possibility of achieving the target indicators set out in the Uzbekistan – 2030 Strategy [11], [12].

2. Materials and Methods

The forecast indicators were calculated by the author on the basis of the developed econometric models [13]. The year 2025 was taken as the baseline, and the forecast period covers 2026–2030, consistent with the end date of the Uzbekistan – 2030 Strategy. The baseline socio-economic indicators of the region are presented in Table 1.

Citation: Erali ugli, E. S. Econometric Modelling of The Scenario Forecast of The Socio-Economic Development of The Bukhara Region Up to 2030. American Journal of Economics and Business Management 2026, 9(7), 55-60

Received: 10th Apr 2026
Revised: 21th May 2026
Accepted: 08th June 2026
Published: 01th July 2026

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Table 1. Baseline socio-economic indicators of the Bukhara region (2025)

No.	Indicator	Unit	2025	vs. 2020
1	Gross regional product (GRP)	bln soums	86,608.1	2.45 times
2	Fixed-capital investment	bln soums	61,590.6	5.06 times
3	Investment / GRP ratio	%	71.1	+36.6 p.p.
4	Unemployment rate	%	5.2	–5.4 p.p.
5	Export volume	mln $	1,654.1	+79.1%
6	Import volume	mln $	2,444.8	+112.0%
7	Foreign-trade balance	mln $	–790.7	-
8	Small-business share in GRP	%	60.2	+7.7 p.p.

Source: compiled by the author based on data of the national Statistics Agency and the Statistics Department of the Bukhara region.

The data show that over 2020–2025 the regional economy passed through an intensive-development phase: GRP grew 2.45 times and investment 5.06 times. However, the foreign-trade deficit and the high growth rate of imports define the structural problems that must be considered in forecasting [14], [15], [16].

3. Result and Discussion

Econometric Models and Explanatory Factors

As the mathematical-statistical apparatus for forecasting, multifactor regression models were used for the four districts (Gijduvan, Karakul, Vabkent, Romitan). The models were built on time-series data covering 2017–2024 and possess high statistical reliability ($R^2 = 0.918–0.967$). The general form of the model is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_6 X_6 + \varepsilon \quad (1)$$

where Y - GRP (bln soums); X_1 - investment; X_2 - new jobs; X_3 - small-business share; X_4 - industrial index; X_5 - exports; X_6 - social-infrastructure expenditure. The quality indicators of the models are given in Table 2.

Table 2. Quality indicators of the econometric models by district

District	R^2	F-statistic	p-value	DW	Rating
Gijduvan	0.967	367.18	0.001	1.89	Excellent
Karakul	0.945	289.45	0.001	1.92	Excellent
Vabkent	0.934	245.67	0.001	1.87	Excellent
Romitan	0.918	198.34	0.001	1.94	Excellent

Source: calculated by the author in SPSS 24.

Forecasting Scenarios

To create a basis for management decision-making under uncertainty, three distinct scenarios were developed. The scenario-analysis approach is oriented towards constructing a systematic set of possible variants that may occur under different conditions, rather than forecasting a single definite path of the future (Table 3).

Table 3. Forecasting scenarios and their parameters (2026–2030)

Scenario	Annual GRP growth, %	Investment growth, %	Export growth, %	Probability of realisation, %
Inertial	11	12–14	8–10	75 (high)
Moderate	15	18–20	15–18	60 (medium)
Optimistic	20	22–25	25–30	50 (medium)

Source: developed by the author.

The inertial scenario assumes the continuation of existing trends without additional measures (the "do-nothing" option); the moderate scenario assumes the partial implementation of the proposed mechanisms; and the optimistic scenario assumes the full implementation of all organisational-economic mechanisms and the comprehensive participation of all stakeholders.

Gross Regional Product Forecast

By combining the econometric models with the scenario parameters, a forecast of GRP dynamics for 2026–2030 was computed (Table 4, Figure 1).

Table 4. Scenario forecast of the GRP of the Bukhara region (2026–2030, bln soums)

Scenario	2025	2026	2027	2028	2029	2030
Inertial	86,608	96,135	106,710	118,448	131,477	145,940
Moderate	86,608	99,599	114,539	131,720	151,478	174,200
Optimistic	86,608	103,930	124,716	149,659	179,591	215,509

Source: calculated by the author using the econometric models.

The calculations show that the gap between the three scenarios widens over time. By 2030, the difference between the inertial and optimistic scenarios reaches 69,569 billion soums, equivalent to about 80% of the total GRP of 2025. Under the optimistic scenario, the region's GRP is expected to reach 215.5 trillion soums, a 2.49-fold increase relative to 2025.

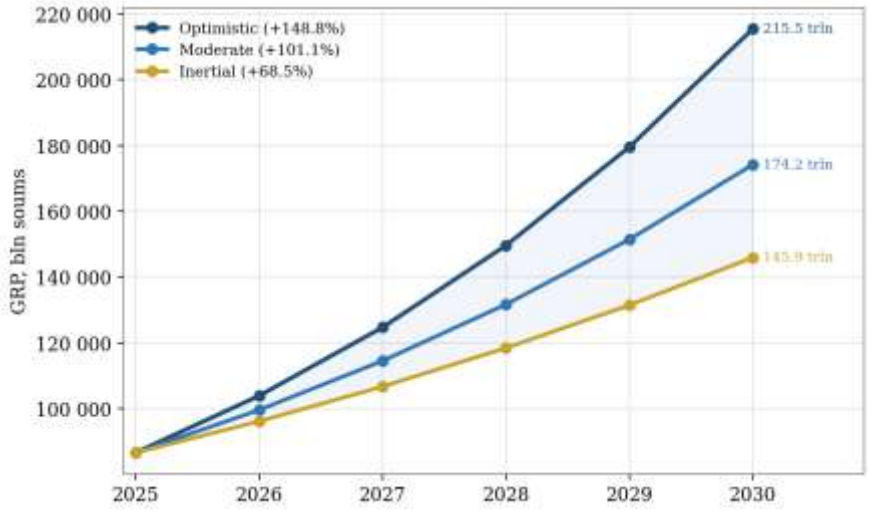


Figure 1. Scenario forecast of the GRP of the Bukhara region (2025–2030)

Under the optimistic scenario, the most significant leap across districts is expected in the Romitan district (+181.5%), while the Gijduvan district retains its absolute leadership (10,256.7 bln soums). This is a quantitative proof of achieving intra-regional territorial balance (Figure 2).

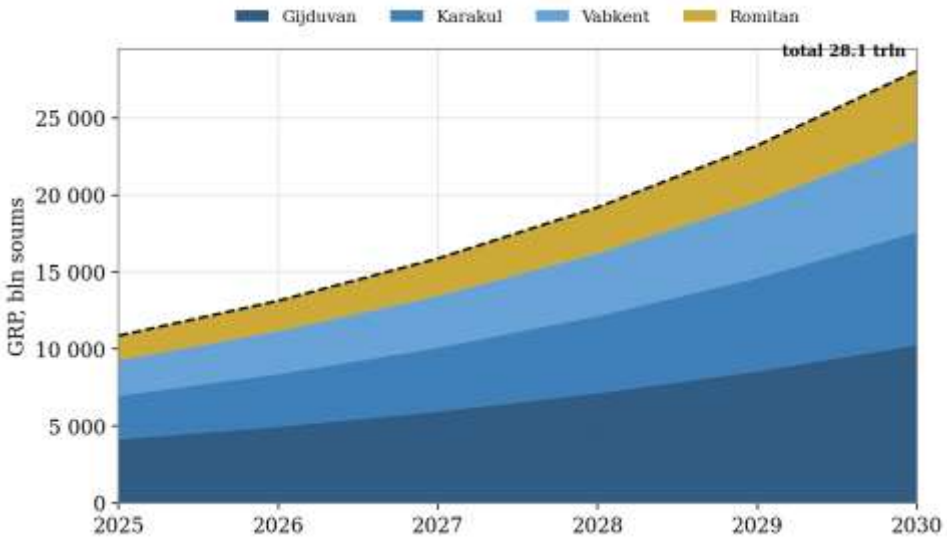


Figure 2. GRP forecast by district (2025–2030, optimistic scenario)

Employment and Unemployment Forecast

The expected effect of employment policy is of great social importance for the region. Under the optimistic scenario, the region's average unemployment rate is expected to fall from 5.2% to 3.7%. The largest reduction (2.4 percentage points) is forecast for the Romitan district (Table 5, Figure 3).

Table 5. Forecast of the unemployment rate (optimistic scenario, %)

District	2025	2028	2030	Change, p.p.
Gijduvan	5.3	4.2	3.7	–1.6
Karakul	5.7	4.5	4.0	–1.7
Vabkent	6.4	5.1	4.4	–2.0
Romitan	6.8	5.2	4.4	–2.4
Region average	**5.2**	**4.2**	**3.7**	**–1.5**

Source: calculated by the author.

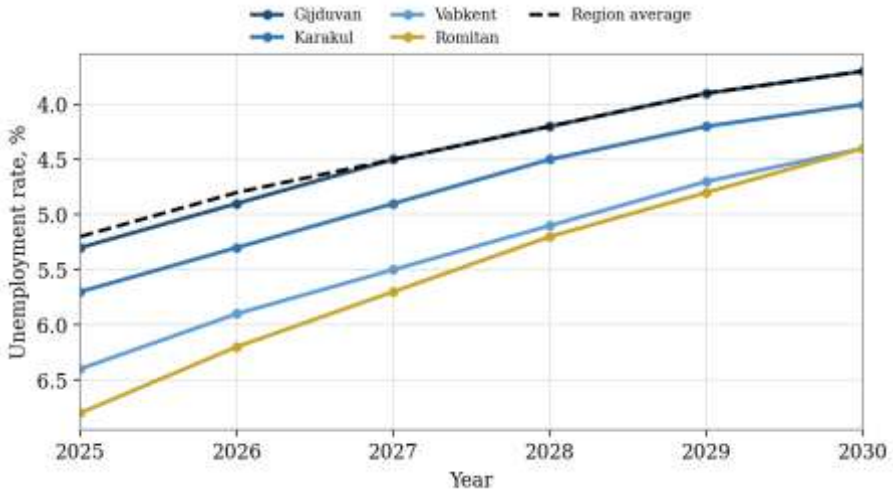


Figure 3. Forecast dynamics of the unemployment rate by district (2025–2030)

Foreign-Trade Balance Forecast

The improvement of the foreign-trade balance is a particularly important area of the forecast results. An exponential model was used to forecast the export dynamics:

$$\text{Export} = 1091.45 \times e^{0.183t} \quad (2)$$

The foreign-trade deficit of 790.7 million USD in 2025 is expected to turn into a positive balance by 2030, i.e. a surplus of 178.5 million USD, provided that the proposed package of measures is implemented. This represents a total improvement of 969.2 million USD (Table 6, Figure 4).

Table 6. Forecast of foreign-trade indicators (optimistic scenario)

Indicator	2025	2026	2027	2028	2029	2030
Export, mln $	1,654.1	1,984.9	2,381.9	2,858.3	3,429.9	4,115.9
Import, mln $	2,444.8	2,689.3	2,958.2	3,254.0	3,579.4	3,937.4
Balance, mln $	–790.7	–704.4	–576.3	–395.7	–149.5	+178.5
Exp./Imp. ratio	0.68	0.74	0.81	0.88	0.96	1.05

Source: calculated by the author.

As a result of the forecast, the export-to-import ratio is expected to rise from 0.68 to 1.05, meaning that the foreign-trade balance will not only improve but also reach a positive value. By 2030, the export volume will reach 4.1 billion USD (+148.8%).

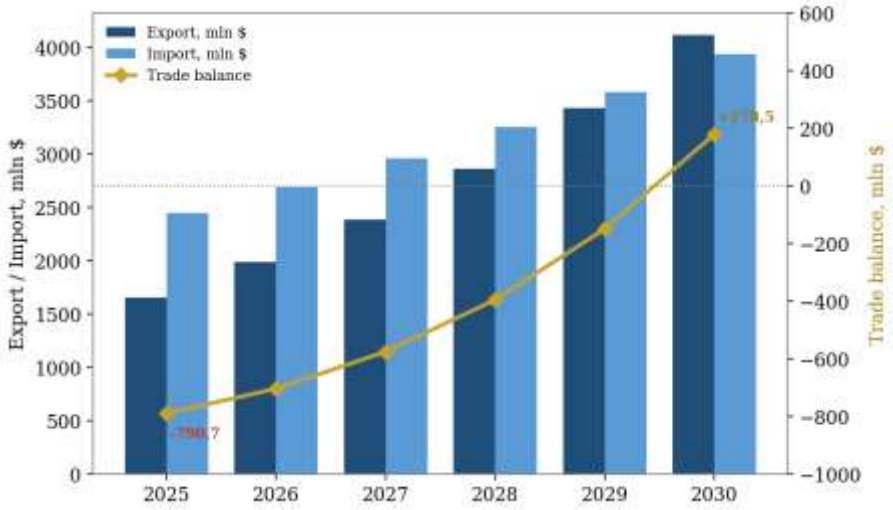


Figure 4. Forecast of exports, imports and the foreign-trade balance (2025–2030)

4. Conclusion

The forecasting carried out by combining econometric modelling with a scenario approach supports the following conclusions. Under the optimistic scenario, by 2030 the region's GRP will reach 215.5 trillion soums (+148.8%), investment will reach 153.3 trillion soums, exports will reach 4,115.9 million USD, the unemployment rate will fall to 3.7%, and the foreign-trade deficit will be replaced by a surplus of 178.5 million USD.

The district-level forecast indicates a process of intra-regional convergence: the relative growth rate of the Romitan district is the highest (+181.5%), and the gap among districts narrows significantly. This confirms that targeted management policy leads to balanced development.

The econometric models built possess high statistical reliability ($R^2 = 0.918–0.967$) and constitute an effective scientific-practical tool for forecasting regional development trends. It should be emphasised that the realisation of the optimistic scenario is not an automatic process - it requires the comprehensive participation of all stakeholders, political will and consistent institutional reforms. The presented forecast indicators may serve as criteria for achieving the goals of the Uzbekistan – 2030 Strategy.

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