DEVELOPMENT SCENARIOS OF UZBEKISTAN'S ACTIVE LABOR FORCE UNTIL 2030 AND THEIR ECONOMIC IMPLICATIONS

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Abstract

In this article, the development trends and forecast indicators of the active labor force in the Republic of Uzbekistan for the period 2024–2030 are analyzed. The study evaluates the dynamics of changes in the active labor force based on three scenarios - optimistic, pessimistic, and baseline approaches. Using the actual indicators of 2024, the potential scale of growth or decline in labor resources up to 2030 has been determined. The optimistic scenario suggests a significant increase in the labor force, while the pessimistic scenario indicates only minimal growth. The baseline forecast reflects moderate growth rates. Based on these analyses, scientific conclusions have been drawn regarding ensuring labor market stability, increasing employment levels, and effectively planning economic policy.

Key words: active labor force, labor market, forecasting, optimistic scenario, pessimistic scenario, baseline scenario, economic analysis, Uzbekistan.

1. Introduction

The labor market plays an important role in the economic and social stability of every country. The working-age population — the active labor force — is one of the key factors that determines production capacity, employment levels, and opportunities for economic growth. In the case of Uzbekistan, demographic growth, migration processes, the education system, and economic reforms directly affect the composition of labor resources. From this perspective, accurately forecasting the future size of the active labor force is of great importance in shaping economic policy. This article analyzes the active labor force for the period from 2024 to 2030 based on three scenarios (optimistic, pessimistic, and baseline). The results of the analysis serve to draw scientifically grounded conclusions aimed at ensuring the sustainable development of the labor market, creating new jobs, and improving employment policies in the country.

2. Literature review

Recent studies have examined labor force dynamics and projections in Russia and the European Union. In Russia, research indicates a consistent trend in labor resources of active working age, despite the COVID-19 pandemic and seasonal fluctuations (Тюленева & Носырева, 2020; Tyuleneva & Kurashova, 2020). However, demographic challenges and geopolitical tensions may limit economic growth, although territorial expansion and pension reforms could partially offset these effects (Krupnov & Rubinshtein, 2024). In the EU, labor force projections up to 2053 for 26 countries reveal a significant shift towards tertiary education across all analyzed nations (Loichinger, 2015). This educational upgrading of the European workforce is expected to mitigate some economic consequences of population aging and shrinking labor force. These projections, which consider age, sex, and educational attainment, provide valuable inputs for forecasting economic growth that accounts for educational differentials in labor productivity (Loichinger, 2015).

Labor force forecasting models have evolved to incorporate various factors for improved accuracy. Barnichon and Nekarda (2012) developed a model using labor force flows data that outperforms traditional forecasts, especially during recessions and cyclical turning points. Fuchs et al. (2017) presented a stochastic model for Germany, integrating population and labor supply forecasts, which

predicts a high probability of decreasing labor supply despite rising birth rates and immigration. Toossi (2012) focused on U.S. labor force projections to 2020, predicting slower growth due to the aging baby-boom generation and decreased labor force participation rates. These studies highlight the importance of considering demographic changes, educational trends, and labor market dynamics in forecasting the active labor force.

3. Methodology

3.1. Data source and variables

This research seeks to project the labor force supply in the Republic of Uzbekistan for the period 2025–2030, drawing upon statistical indicators from 2010 to 2024. The study employs a quantitative methodology, with time series trend analysis and regression modeling adopted as the principal analytical tools. Through these methods, future values are estimated on a statistical basis, thereby providing a foundation for forecasting key labor market parameters.

3.2. Model construction

In the analysis, the aggregate labor force supply (*alf*) was designated as the key indicator. It was calculated using the following formula: $alf = lf \times alfr / 100$, here *lf* — the size of the working-age population, *alfr* — labor force participation rate (%). In the study, a time-based regression of the *alf* indicator was constructed, through which the projected values for the period 2025–2030 were estimated.

The model was based on the following linear regression equation:

$$alf_t=\alpha+\beta year_t+\varepsilon_t \qquad (1)$$

here alf_t — the labor force supply in year t, $year_t$ — year, α va β — regression coefficients, ε — error terms.

In the study, the projection was not limited to the baseline trend alone; a scenario-based approach was also applied. Specifically, optimistic and pessimistic scenarios were developed on the basis of changes in the economic activity rate. In the optimistic scenario, the economic activity rate increases annually by +0.5%, whereas in the pessimistic scenario it decreases by –0.3% per year. For each scenario, the *alf* was recalculated using updated *alfr* values together with the annual figures of the working-age population.

All computations and graphical analyses were carried out using the STATA software package. The obtained forecasts were comparatively analyzed through tables and graphical representations.

4. Analysis and results

Table 1: Descriptive statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
lf	15	18559.75	942.9781	16726	19997.3
alfr	15	72.41333	1.677527	69.7	75

One of the analyzed indicators is the working-age population (*lf*) variable, which consists of 15 observations for the period 2010–2024. During this period, the average value of the *lf* variable amounted to 18,559.75 thousand people, or approximately 18.5 million individuals. The standard deviation of 942.97 indicates that this indicator has exhibited a stable annual growth trend. The minimum value was 16,726 and the maximum reached 19,997.3, which demonstrates that the size of the working-age population in Uzbekistan has consistently increased over the past 15 years.

The second variable is the labor force participation rate (*alfr*), which represents the share of the economically active population expressed as a percentage. The average value of this indicator is around 72.41%, indicating that nearly three-quarters of the working-age population are engaged in economic activity. The standard deviation is 1.68 percentage points, suggesting that annual fluctuations in the *alfr* have been relatively small and stable. The minimum value was 69.7% and the maximum 75%, which reflects the narrow range of variation in economic activity.

Overall, this descriptive statistical analysis shows that the size of the working-age population in Uzbekistan has been steadily increasing, while the economic activity rate has remained relatively stable. This provides an important basis for forecasting labor force supply and formulating employment policies.

Table 2: The test of stationarity of variables.

Test statistic	Dickey–fuller critical value			p-value for Z(t)
	1%	5%	10%	
alf -3.048	-3.750	-3.000	-2.630	0.0306

*Note: ***p<0.01; **p<0.05; *p<0.1*

It is evident that the test statistic is smaller than the critical value at the 5% significance level (–3.048 < –3.000), which provides sufficient grounds to reject the null hypothesis of a unit root. The MacKinnon p-value equals 0.0306, which is also below the 5% threshold, thereby statistically confirming that the *alf* variable is stationary.

Thus, based on the obtained results, it is determined that the *alf* time series is stationary in levels and does not require first differencing. This implies that no additional differencing procedures are necessary in model specification, and the series can be directly employed for forecasting purposes.

Table 3: Regression analysis results

Source	SS	df	MS	Number of obs = 15
Model	11416417.9	1	11416417.9	**F(1, 13) = 208.02**
Residual	713460.101	13	54881.5462	**Prob > F = 0.0000**
Total	12129878	14	866419.857	**R-squared = 0.9412**
				Adj R-squared = 0.9367
				Root MSE = 234.27

alf	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
year	201.9231	14.0002	14.42	0.000	171.6775	232.1686
_cons	-393828	28238.46	-13.95	0.000	-54833.5	-332822.

The model results indicate a strong and positive relationship between *alf* and year. The regression coefficient of year is estimated at 201.92, meaning that, on average, the labor force supply increases by approximately 201.9 thousand individuals each year. This coefficient is highly statistically significant ($p < 0.001$), with a t-statistic of 14.42, confirming the robustness of the model.

The model's R-squared (R^2) is 0.9412, indicating that 94.12% of the variation in the *alf* variable is explained by year. In other words, the time factor accounts for a substantial proportion of the changes in *alf*. The F-statistic (208.02) likewise confirms the overall significance of the model ($p = 0.0000$).

The intercept coefficient is –393,828, which is necessary for expressing the model in its mathematical form; however, its practical interpretation is not directly relevant within the current time context.

Overall, the model results demonstrate that the labor force supply in Uzbekistan has grown steadily and consistently over the period 2010–2024, and this trend has been maintained throughout the years. On the basis of this model, it is possible to generate reliable forecasts for the period 2025–2030.

Table 4: Results of projected active labor force till 2030 (*1000 people)*

year	actual active labor force	active labor force, forecast	active labor force, forecast_*opt*	active labor force, forecast_*pess*
2024	14458,05	14864,22		
2025		15066,15	15454	14678
2026		15268,07	15841	14695

2027		15469,99	16229	14712
2028		15671,92	16616	14729
2029		15873,84	17004	14746
2030		16075,76	17392	14763
Δ	-	*1617,71*	*2933,95*	*304,95*

The obtained results, when represented graphically, take the following form.

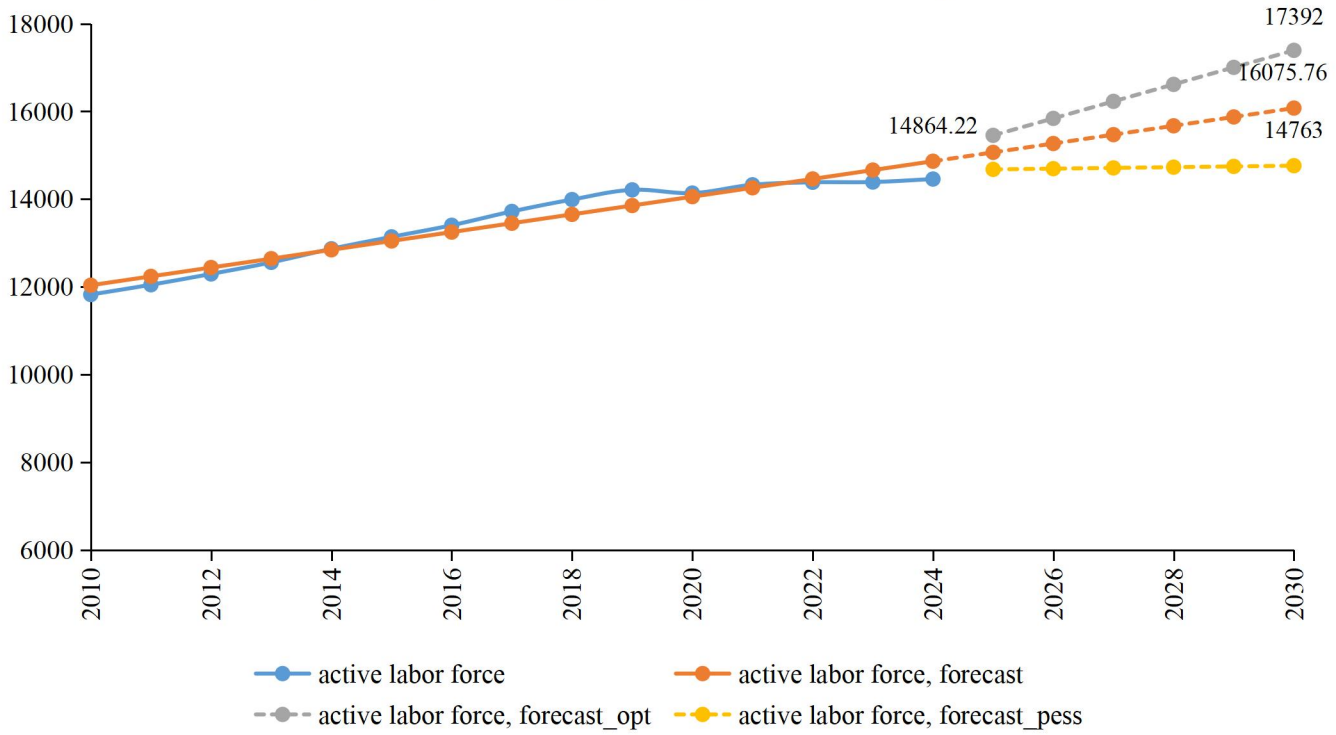


Figure 1: Line graph description of forecast results of active labor force (*1000 people*)

The presented forecast table serves to analyze the development trend of labor force supply in the Republic of Uzbekistan over the period 2024–2030. Alongside the actual figures for 2024, the table provides three types of forecasts — baseline (realistic), optimistic, and pessimistic scenarios.

In 2024, the actual size of the active labor force amounted to 14.458 million people. According to the baseline forecast, this figure is expected to reach 16.076 million by 2030, representing an increase of 1.617 million. Under the optimistic scenario, which incorporates annual growth in the economic activity rate, the labor force is projected to reach 17.392 million by 2030. This scenario implies an increase of 2.934 million, which is significantly higher compared to the baseline forecast.

Conversely, the pessimistic scenario takes into account the potential decline in economic activity. Under this condition, the active labor force will amount to only 14.763 million by 2030, representing an increase of merely 305 thousand compared to 2024. This outcome links the growth of labor force supply primarily to demographic expansion, while the decline in economic activity constrains real opportunities in the labor market.

5. Conclusion

The above analyses demonstrate that the growth rates of labor force supply are directly dependent on the level of economic activity. Accordingly, innovations in employment policy, the promotion of women's and youth participation in the labor market, and the development of a skilled labor force through education are among the key factors that can ensure the realization of the optimistic scenario. By contrast, the pessimistic scenario reflects an inertial development of the labor market, explained by adverse economic and social factors, including external migration and demographic decline.

The future state of the labor market may vary considerably under the influence of both external and internal factors. Policymakers and government institutions should therefore take these scenarios into account and adopt measures that secure sustainable growth of the active labor force — including strengthening employment policies, ensuring alignment between the education system and labor market needs, and supporting youth employment.

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