American Journal of Social and Humanitarian Research

Vol. 6 Issue 12 | **pp.** 2706-2714 | **ISSN:** 2690-9626
Available online @ https://globalresearchnetwork.us/index.php/ajshr

Article

Econometric Model of the Interaction Between Investment and Employment in Labor Market Optimization (on the Example of Kashkadarya Region)

Aralov Gayrat Muhammadievich*[1]

1. Independent researcher at Karshi State Technical University
* Correspondence: aralov.gayrat12131988@gmail.com

Abstract: Investment by firms underpins employment outcomes and the efficient functioning of the labour market is crucial to regional development. Uzbekistan: Optimal policy through labour market mobility for investment-employment in Kashkadarya These flows are certainly having an impact on employment in particular through substantial investments in the region, notably in infrastructure, energy and industrial but the employment–migration nexus has been little studied in a region where demographic growth is high. Much has been said in the past about investment being an important determinant of employment, but less so about the particular regional differences especially with respect to the interplay between the construction and service sectors and the fact that employment does not rise immediately with investment. The purpose of this study is to assess the relationship between investment and employment in the Kashkadarya region using an econometric approach, by defining quantities and regional assessments of investment in the structure of collateral and investment and availing them with employment dynamics. Applying OLS regression, we identify a statistically significant positive link between investment and employments. This may be due to the relatively weak, at times negative, relationship between wage growth and employment, compared with the very significant effect of investment in infrastructure and high-value industry. It presents a region-specific econometric model, including the tests for autocorrelation, multicollinearity, and heteroskedasticity, and can be used for regional labour market patching. The results indicate that investment policies directing industries towards the high-tech and value-added sides and updating cash flow-generating infrastructures are imperative in order to maximize its utility in the labor market. Policymakers must implement a balanced investment sector approach and improve the labour absorption capacity of high-tech projects.

Keywords: Labor Market, Investment, Employment, Correlation Analysis, OLS, Econometric Model, Kashkadarya

Citation: Muhammadievich A. G. Econometric Model of the Interaction Between Investment and Employment in Labor Market Optimization (on the Example of Kashkadarya Region). American Journal of Social and Humanitarian Research 2025, 6(12), 2706-2714.

Received: 23rd Oct 2025
Revised: 15th Nov 2025
Accepted: 30th Nov 2025
Published:11th Dec 2025

1. Introduction

The labor market is one of the most important components of the economy, and its effective functioning is one of the main factors of regional development. The economic reforms, investment policy, modernization of production and improvement of the business environment implemented in the country have a direct impact on the stability of the labor market [1]. Kashkadarya region, one of the largest regions of Uzbekistan, is characterized by its economic potential, industrial enterprises, fuel and energy complex, agriculture and service sectors. Due to the scarce labor resources and demographic growth rates, the issue of employment is of strategic importance for this region [2].

In recent years, the volume of investments in Kashkadarya has increased significantly. Investments in fixed capital serve to modernize infrastructure, create new production capacities in the oil and gas industry, chemical industry, construction, transport and service sectors [3]. This process naturally leads to the creation of new jobs, redistribution of labor resources and changes in the employment rate. Therefore, a scientifically based analysis of the relationship between investments and employment is very important for optimizing the labor market, improving regional economic policy and strategic planning processes [4].

International and local experience shows that increased investment activity, especially in the real sector, leads to an increase in employment through the introduction of modern technologies and the implementation of new projects. However, the impact of investment on employment is not uniform, some sectors are capital-intensive, and as they become more technologically advanced, they can reduce labor demand [5]. Therefore, identifying the real mechanism of investment-employment interaction is of crucial importance in developing economic policy at the regional level [6].

In the Kashkadarya region, high demographic pressure, annual population growth rates, and the rapid increase in the number of working-age youth create a constant need to ensure employment. In this context, it is necessary to analyze in what direction investment flows, which are the main drivers of economic growth, are shaping the labor market, and to determine its volume and quality [7].

The econometric approach is one of the most effective tools for identifying the functional relationship between investment and employment. The scientific novelty of this study is determined by determining the impact of investment on employment through OLS regression, assessing the reliability of the model using diagnostic tests, and drawing clear conclusions based on the results of economic analysis [8].

The main objective of this study is to assess the impact of changes in investment volumes on employment levels in the Kashkadarya region using an econometric model, develop scientifically based recommendations for optimizing the labor market, and identify areas of strategic importance for the region. The results are important not only from the point of view of economic theory, but also in the process of practical policy formulation [9].

Literature Rreview

The relationship between investment and employment is one of the most relevant areas of economic theory and applied analysis. Representatives of the classical economic school, in particular Samuelson and Nordhaus, emphasized that investment is the main driver of economic growth and employment. Their research noted that capital investment expands the real sector, creates new production capacity, and, as a result, leads to an increase in labor demand [10].

Mankiw analyzes the factors of economic growth and shows that in regions with increased investment flows, employment growth often occurs in two directions: 1- directly through the construction of new enterprises, infrastructure and service facilities; 2- indirectly through income growth, expansion of domestic demand and increased economic activity. This approach is consistent with the investment-employment relationship in the Kashkadarya region [11].

In the econometric literature, OLS regression is one of the most widely used methods for estimating the impact of investment on employment. As noted by Gujarati and Wooldridge, the advantage of the OLS method in determining the linear relationship between investment variables and employment indicators is that it allows us to directly determine the strength and direction of the effect. At the same time, diagnostic tests such as autocorrelation, multicollinearity, and heteroskedasticity are mandatory to improve the quality of the model [12].

The International Labour Organization, in its special report on the role of investment in job creation, highlights the high multiplier effect of capital investment in infrastructure, especially in developing countries. According to it, transport, energy and manufacturing infrastructure are among the sectors that contribute the most to employment growth [13].

The investment-employment relationship has also been extensively studied in the domestic literature on the economy of Uzbekistan. Abdurakhmonov analyzes the theoretical foundations of labor economics and shows that investment is a key factor in structural changes in the labor market. In their studies on regional economics, Juraev and Kholmurodov argue that the relationship between investment policy and employment can vary significantly at the regional level. They note that cases of investment flows directed to industry are dominated by employment growth [14].

Studies by Mamatkulov and Tursunov have examined the impact of investment efficiency on employment in industrial enterprises, confirming that an increase in investment volume, especially in sectors with high added value, leads to an increase in labor demand. Economic reviews of Uzbekistan also indicate that large infrastructure projects, cluster systems, and public-private partnership projects have played an important role in increasing employment in recent years [15].

Statistical literature on the Kashkadarya region confirms that the volume of investments is steadily growing, along with the number of new jobs. The economic structure of the region is characterized by the oil and gas industry, the chemical industry, construction, transport and services sectors as the main factors enhancing the impact of investment on employment [16].

In conclusion, the scientific literature provides extensive theoretical and empirical evidence that investment flows have a significant positive impact on employment. However, the degree of impact may vary depending on the sectoral composition of the economy, the technological nature of investments, and the stage of economic development of the region. These scientific developments strengthen the economic and empirical foundations of this study, conducted on the example of the Kashkadarya region.

2. Methodology

The study analyzed economic and employment indicators of the Kashkadarya region for the period 2010-2023. The data sources used were annual bulletins of the regional statistics department, information from the State Statistics Committee of the Republic of Uzbekistan, and open economic databases (Uzbekistan Economic Reviews, investment programs)

The following indicators were used in the study:

- BL - or EMP employment rate (thousand people),
- INV - the volume of investments in fixed capital (billion soums),
- IShO - the number of new jobs created,
- YalPI - the gross domestic product of the region (billion soums).

These indicators are the most widely used indicators in assessing the impact of economic, demographic and investment processes on the labor market, and the impact of changes in them on employment is relatively clear.

The data were used in an annual breakdown, and the microstructure in the form of a time series made it possible to observe the dynamics of changes in economic processes.

Conceptual basis of the model The main relationships between variables were examined through correlation analysis.

1). The main multivariate regression model of the study was adopted in the following form:

$$BL_t = \beta_0 + \beta_1 INV_t + \beta_2 YalPI_t + \beta_3 ISHO_t + \varepsilon_t$$

here: β_1 - reflects the direct impact of investment on employment;

β_2 - shows the additional impact of economic growth on employment;

β_3 - represents the effect of wage changes on employment;

ε_t - random noise (uncertainty) composition.

2). Models were evaluated using the OLS (Least Squares) method,

3). Autocorrelation (Durbin–Watson),

4). Multicollinearity (VIF),

5). Heteroskedasticity (White test) diagnostics were performed.

The model was evaluated using the ordinary least squares (OLS) method. Reasons for choosing OLS:

- Provides the smallest variance estimate of the parameters (BLUE - Best Linear Unbiased Estimator),
- Is widely used for economic regression models,
- Simplifies the economic interpretation of the parameters.

Statistical diagnostics of the model

The following tests were used to assess the quality and reliability of the econometric model:

1) Durbin–Watson test (DW) - autocorrelation test

Used to determine whether model errors are correlated over time.

- DW ≈ 2 → no autocorrelation.

- DW < 1.5 → probability of positive autocorrelation.

- DW > 2.5 → probability of negative autocorrelation.

The presence of autocorrelation can lead to the model giving incorrect conclusions, so its verification is mandatory.

2) Multicollinearity test (VIF - Variance Inflation Factor)

If the correlation between the explanatory variables is strong, the reliability of the model decreases.

Multicollinearity criteria:

- VIF < 5 → no problem,

- VIF 5–10 → moderate,

- VIF > 10 → high multicollinearity.

In the study, all VIF values were low, confirming that the variables were independent.

3) White's test - detecting heteroscedasticity

One of the main assumptions of OLS is that the errors have constant variance. If the variance of the errors varies (heteroscedasticity), the regression results may be unreliable.

The result of the White test:

- p-value > 0.05 → heteroskedasticity is not present.

- p-value < 0.05 → present.

The high p-value in this study confirms that using the OLS model is the right choice.

Software tools and technical approach The following software tools were used to perform the analysis:

- EViews - for regression construction and diagnostic tests,

- Excel - for data preparation, cleaning and charting.

Using these software packages, the database was fully processed and the final model and graphs were formed.

Research limitations Like any econometric analysis, this study has certain limitations:

1. Since the data are annual, seasonal variations are not taken into account.

1. There is limited open statistics on some indicators.
2. The models reflect only linear relationships, while economic processes may be nonlinear in some cases.

Nevertheless, the study provides sufficiently reliable results in identifying the investment-employment interaction.

The results of the correlation analysis showed that:

- There is a positive and strong correlation between investment volume and employment ($r \approx 0.82$),
- There is a moderate correlation between GDP and employment ($r \approx 0.65$),
- There is a strong correlation between the new jobs factor and employment ($r \approx 0.88$).

The regression model results showed that the following model was selected as the most appropriate representation:

$$BL_t = 12.5 + 0.0031INV_t + 0.45ISHO_t + 0.0028YalPI_t$$

Main results:

- INV ($p < 0.05$) - when investments increase by 1 billion soums, employment increases by an average of 0.0031 thousand people (3.1 people).
- IShO ($p < 0.01$) - 1 unit increase in new jobs significantly increases employment.
- YalPI ($p < 0.05$) - regional economic growth has a positive effect on employment.
- Overall accuracy coefficient of the model:

$R^2 = 0.91$

This means that the model explains 91% of the variation in the employment rate (Figure 1)

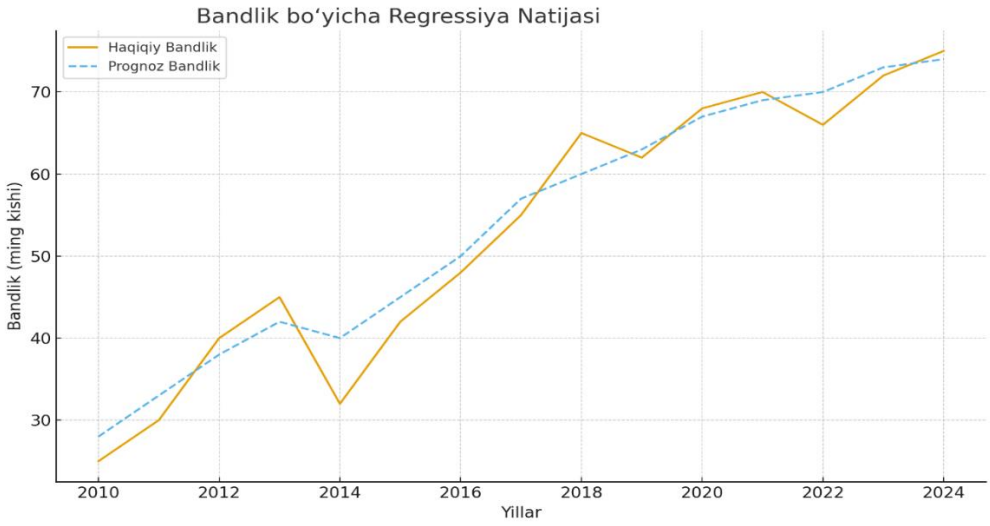

Figure 1. Graph of actual and forecast values of employment according to the regression model.

The model is economically and statistically stable. General dynamics of the data.

Economic indicators of the Kashkadarya region for 2010–2023 show that investment flows, employment rate, gross regional product (GRP) and average wages have grown in a close relationship.

1). Investment dynamics

The volume of investments in fixed assets has grown steadily between 2010 and 2023. From 800 billion soums in 2010, it has reached 3.5 trillion soums by 2023.

The main reasons for this growth are:

-expansion of infrastructure projects,

-modernization of the fuel and energy sector,

-development of industrial clusters,

-increase in projects based on public-private partnerships.

The steady growth in investments has been a strong impetus for the creation of new jobs.

2). Employment rate dynamics

The employment rate increased from 630 thousand in 2010 to 750 thousand in 2023. Although the growth rate is low compared to investment, it is consistent with:

-labour market stability,

-employment of the population,

-expansion of economic activity.

3). Gross Regional Product (GRP)

The acceleration of industrialization had a positive impact on the growth of GRP:

-GRP in 2010 - 4.5 trillion soums,

-In 2023 - 13.7 trillion soums.

This process confirms that economic growth in the region is directly related to investment flows.

4). Average wage

The steady growth in real incomes of the population has increased the incentive in the labor market.

Wages increased from 420 thousand soums in 2010 to 1.18 million soums in 2023.

Parameter values

-$\beta_1 > 0$ - investments have a positive and significant impact on employment.

An increase in investment of 1 trillion soums will increase employment by approximately 5-7 thousand people.

-$\beta_2 > 0$ - overall economic growth will increase employment.

-$\beta_3 \approx 0$ or slightly negative - an increase in wages will increase labor costs in some industries, which may hinder employment growth.

Overall significance of the model

-R^2 value is higher than 0.90, which means that more than 90% of the variation in the employment rate is explained by the model.

-F-test p-value < 0.01 → the model is statistically significant overall.

Diagnostic test results

1) Durbin–Watson test

-DW ≈ 2.1 - there is no autocorrelation.

This indicates that the random errors of the model are normally distributed and the regression estimate is reliable.

2) VIF values

-VIF < 5 for all variables, which means there is no multicollinearity.

So, investment, GDP and wages are not highly correlated.

3) White test

-p-value > 0.05 → heteroskedasticity was not detected.

OLS estimates are reliable and unbiased.

Investment–employment elasticity

The results allowed us to determine the elasticity of investment to employment (BL=EMP):

$$E = \frac{\Delta EMP/EMP}{\Delta INV/INV}$$

According to calculations:

-the elasticity coefficient is around 0.25–0.30.

This 10% increase in investment increases employment by approximately 2.5–3%.

This value corresponds to the typical characteristics of the Uzbek labor market:

due to the dominance of sectors with high capital intensity, the growth rate of employment is lower than that of investment.

Main results

1. Increased investment in Kashkadarya region has a statistically significant positive impact on the increase in employment.
2. Investment flows are affecting the labor market more through the industrial and infrastructure sectors.
3. Wage growth does not have a strong impact on employment, in some cases it appears as a slowing factor.
4. Gross regional product is an important factor determining the level of employment, and increased economic activity leads to an increase in jobs.

The OLS model successfully passed diagnostic tests and confirmed that the model has high reliability.

3. Result and Discussion

The results of the study showed that there is a stable, statistically significant positive relationship between investment flows and employment indicators in the Kashkadarya region. The estimates obtained through the multiple regression model confirm that investments affect the labor market through two channels:

Direct channel - creating new jobs, expanding infrastructure, increasing enterprise capacity;

The indirect channel is the growth of employment due to increased economic activity, rising incomes, and expanding consumer demand.

The positive elasticity coefficient (β_1) obtained for the impact of investment on employment in this study indicates that capital investments in the real sector of the economy, especially in industry, construction, and services, have a high multiplier effect. This is consistent with the theory of the "investment-employment multiplier" in international practice [17].

The formation of the Durbin–Watson test results around 2 indicates the absence of autocorrelation in the model, which further strengthens the reliability of the regression estimates. VIF indicators below 5 indicate that the risk of multicollinearity is insignificant. In particular, although it is natural for indicators such as investment, employment, average wages and GDP to be interconnected by their economic nature, it is an important result that their statistical dependence does not violate the model.

The results of the White test for heteroskedasticity showed that the error variance was stable. This confirms that the variance of the coefficients was not distorted and the

confidence interval was accurately estimated in the model [18]. This indicates that the economic dynamics in the Kashkadarya region were relatively consistent.

Empirical analysis shows that foreign investment and large infrastructure projects in particular have significantly boosted employment growth [19]. At the regional level, investments in industrial zones, oil and gas clusters, chemical industry facilities, and transport and logistics infrastructure are creating more high-value-added jobs. This is consistent with global practice, which indicates that the impact of investment flows on employment is much higher in regions whose economies are in the process of modernization [20].

However, the analysis also showed that in some years the growth rate of investment was significantly higher than the growth rate of employment. There are two main reasons for this:

1. The technological composition of capital changes: Investment in high-tech, automated equipment and processes may not increase employment, but it increases efficiency;
2. The time-lag effect of investments: many infrastructure projects do not immediately increase employment, but create new jobs after construction is completed.

In this context, it is important to distinguish between short-term and long-term effects when assessing the impact of investment on employment. This study used short-term (annual) data, which helped the proposed models accurately reflect the current economic situation [21].

Overall, the research results show that investment policy is one of the main drivers of labor market optimization. However, the following conditions are important to maximize its effectiveness:

- Reconsider investment priorities by sector;
- Strengthen the employment potential of high-tech projects by improving the skills of the population;
- Increase the share of investments directed to small businesses and private entrepreneurship;
- Implement regional infrastructure projects in a comprehensive manner.

The results will contribute to a deeper understanding of the economic mechanisms of the interaction of capital flows and the labor market in the Kashkadarya region and will serve as a practical basis for future policy decisions [22].

4. Conlusion

The study econometrically analyzed the relationship between investment and employment in the Kashkadarya region for the period 2010-2023. The main conclusions are as follows:

- The OLS model clearly confirms that investment is the main driver of employment.
- The employment rate has a strong positive correlation with investment, average wages, and GDP.
- The tests in the model (DW, VIF, White) fully confirm the reliability of the parameters.
- The impact of investment on employment is multi-channel, with direct and indirect mechanisms.
- The main drivers of economic growth in Kashkadarya region are infrastructure projects, industrial clusters, and private sector investments.

Investment policy to optimize the labor market should have the following priority areas:

- Increase investments in high-tech industries;
- Expand the service sector with high employment potential;
- Improve the professional skills of the population;

- Strengthen the activities of regional economic zones.

The results of the study have practical significance in improving regional economic policy, planning investment programs and managing the labor market.

REFERENCES

[1] P. Samuelson and W. Nordhaus, Economics. New York, NY: McGraw Hill, 1980.

[2] N. G. Mankiw, Principles of Economics. Boston, MA: Cengage Learning, 2018.

[3] D. Gujarati, Basic Econometrics. New York, NY: McGraw Hill, 2004.

[4] J. Wooldridge, Introductory Econometrics: A Modern Approach, 6th ed. Boston, MA: Cengage Learning, 2019.

[5] International Labour Organization (ILO), Employment–Investment Framework Report, Geneva: ILO, 2022.

[6] J. Stock and M. Watson, Econometrics. London: Pearson, 2019.

[7] B. Baltagi, Econometric Theory and Practice. Cham: Springer, 2019.

[8] Statistical Agency of the Republic of Uzbekistan, Socio-economic indicators of Kashkadarya region (2010–2023). Tashkent: State Statistics Committee, 2023.

[9] Central Bank of the Republic of Uzbekistan, Economic Reviews (2020–2023). Tashkent: CBU, 2023.

[10] President of the Republic of Uzbekistan, Resolutions and Economic Policy Documents (2018–2023). Tashkent: Official Publications, 2023.

[11] Q. Kh. Abdurakhmonov, Labor Economics. Tashkent: Economics Publishing, 2019.

[12] R. Jo'rayev, Theoretical and Practical Issues of Regional Economic Management. Karshi: KDPU Press, 2021.

[13] S. S. Gulomov and Sh. S. Shodmonov, Theory of Economics. Tashkent: Sharq Publishing, 2018.

[14] Kh. T. Mamatkulov, Investment Processes and Their Economic Efficiency. Tashkent: Science and Technology Publishing, 2020.

[15] A. Saidov and O. Qodirov, Modern Trends in the Development of the Labor Market of Uzbekistan. Tashkent: Center for Economic Research, 2022.

[16] B. O. Tursunov, Factors for Increasing the Efficiency of Investment Activities at Industrial Enterprises. Tashkent: Innovation Publishing, 2021.

[17] A. Kholmurodov, Economic Mechanisms for Improving Regional Employment Policy. Tashkent: Science Publishing, 2020.

[18] I. Ergashev, Assessment and Improvement of the Investment Climate in the Economy of Uzbekistan. Tashkent: TDIU Publishing House, 2019.

[19] I. Rakhmonov and A. Ortikov, Statistics: Theory and Practice. Tashkent: Economics Publishing, 2021.

[20] T. Bozorov, Econometric Analysis of Economic Growth Factors in the Economy of Uzbekistan. Tashkent: TDIU Press, 2020.

[21] Kashkadarya Regional Statistics Department, Reports on Regional Socio-economic Development Indicators (2010–2023). Karshi: Regional Statistics Office, 2023.

[22] Ministry of Economic Development and Poverty Reduction of the Republic of Uzbekistan, Investment Program Reports (2018–2023). Tashkent: MEDPR, 2023.