

ECONOMETRIC ANALYSIS OF THE DEVELOPMENT OF INNOVATIVE ACTIVITY IN THE NATIONAL ECONOMY

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Annotation: The article analyzes the factors of development of innovative activity in the national economy of Uzbekistan using econometric models. Based on data for 2015-2024, a multivariate regression model was constructed and the main factors influencing the production of innovative products were identified. The research results showed high efficiency of R&D investments - the elasticity coefficient is 0.53. Based on the model, forecast indicators for 2025-2030 were developed.

Keywords: innovative activity, econometric model, R&D investments, elasticity coefficient, forecasting, national economy.

Introduction

In the modern global economy, innovation is the main driver of economic growth and competitiveness. According to the World Bank, 50-80 percent of GDP growth in developed countries is provided by innovations. In Uzbekistan, the development of innovative activity has also become a priority in recent years. According to the "Uzbekistan - 2030" strategy, it is planned that the country will take 50th place in the Global Innovation Index, and the share of innovative products in GDP will reach 5 percent.

Scientific substantiation of the factors of development of innovative activity and quantitative assessment of their impact is an urgent scientific and practical task. In this article, the factors influencing innovative activity in the national economy of Uzbekistan are analyzed using econometric modeling methods.

Literature analysis and methodology. The theoretical foundations of innovative activity were created in the works of Y. Schumpeter (1911), K. Freeman (1987), B. Lundval (1992), R. Nelson (1993). The concept of national innovation systems was developed in the works of Ch. Edkvist, F. Malerba, M. Porter. The issues of developing innovative activity in the country were studied in the studies of Uzbek scientists A.M. Abdullayev, N.G. Karimov, M.Kh. Saidov.

The study used multivariate regression analysis, econometric modeling, and statistical forecasting methods. The least squares method (OLS) was used to estimate the model parameters. Multicollinearity (VIF test), heteroskedasticity (White test), autocorrelation (Durbin-Watson test), and normality (Jarque-Bera test) tests were conducted for model diagnostics.

Research results

In Uzbekistan, innovation activity indicators showed significant growth dynamics in 2015-2024. The number of innovative enterprises increased from 834 to 3,266 (3.9 times), the volume of innovative

products production increased from \$ 0.45 billion to \$ 2.8 billion (6.2 times). R&D expenditures increased from 0.08 percent to 0.24 percent of GDP.

The following econometric model was developed to assess the factors affecting the production of innovative products:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \varepsilon$$

Where: Y - Volume of innovative products production (billion dollars); X₁ - R&D expenditures (million dollars); X₂ - Number of innovative enterprises; X₃ - Number of researchers (thousand people); X₄ - Number of start-ups; X₅ - Number of cluster members; ε - random error.

Model estimation results:

$$Y = -0.523 + 0.0082X_1 + 0.0003X_2 + 0.0215X_3 + 0.0008X_4 + 0.0012X_5$$

Model quality indicators are high: R² = 0.993 (the model explains 99.3 percent of the variation in the variables), F-statistic = 113.6 (p = 0.0002), Durbin-Watson = 2.18 (no autocorrelation). The analysis of elasticity coefficients gave the following results:

For R&D: 0.53 (1% increase = 0.53% result);

For enterprises: 0.35 (1% increase = 0.35% result);

For researchers: 0.30 (1% increase = 0.30% result);

For start-ups: 0.26 (1% increase = 0.26% result);

For clusters: 0.27 (1% increase = 0.27% result).

The highest elasticity coefficient of R&D investments (0.53) indicates the high efficiency of funds spent on research and development activities. The elasticity of the number of innovative enterprises (0.35) confirms the need to improve the business environment.

Based on the model, the following forecast indicators were developed for 2025-2027:

2025: \$3.25 billion [3.07; 3.43] confidence interval;

2026: \$3.74 billion [3.52; 3.96] confidence interval;

2027: \$4.28 billion [4.01; 4.55] confidence interval.

Discussion

The results of the study are consistent with international experience. Even in developed countries, R&D investments are a key factor in innovative development. According to OECD (2024), member

countries spend an average of 2.7 percent of GDP on R&D. In Uzbekistan, this figure is 0.24 percent, which indicates a significant growth potential.

The elasticity coefficients of the number of innovative enterprises and start-ups (0.35 and 0.26) confirm the effectiveness of the ecosystem approach. The influence of the number of cluster members (0.27) indicates the presence of a synergy effect.

Conclusions and recommendations

The results of the econometric analysis indicate the following priority areas for the development of innovative activity in Uzbekistan:

1. Increase R&D financing - it is necessary to bring it to at least 0.5 percent of GDP. This will allow increasing the production of innovative products by 50 percent.
2. Encourage innovative enterprises - expand tax incentives, the number of enterprises can be doubled by developing the start-up ecosystem.
3. Develop human capital - it is necessary to increase the number and quality of researchers, expand international cooperation.
4. Strengthen the cluster approach - it is necessary to create at least 2 innovative clusters in each region, expand existing ones.

According to model forecasts, as a result of the implementation of these measures, the volume of production of innovative products by 2027 may reach \$ 4.28 billion. This will significantly increase the global innovation competitiveness of Uzbekistan and achieve the goals set by 2030.

List of used literature

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