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VAZIRLAR MAHKAMASI HUZURIDAGI
BIZNES VA TADBIRKORLIK OLIY MAKTABI

IQTISODIYOT VA TARAQQIYOT
Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal



Yashil

Barqarorlik uchun innovatsiyalar:

Yashil iqtisodiyodga o'tish davrida
biznes va tadbirkorlik bo'yicha



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ECONOMETRIC ASSESSMENT OF THE IMPACT OF INVESTMENTS ON THE ECONOMIC SYSTEM OF SURKHANDARYA REGION

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Abstract: This study examines the role and impact of investments on the economic system of the Surkhandarya region through econometric analysis. By utilizing a robust dataset covering key economic indicators over the past decade, the research identifies the relationship between foreign direct investment (FDI), domestic investment, and regional economic performance. A comprehensive econometric model is employed to quantify the effects of investments on key economic variables such as GDP growth, employment, and industrial development. The findings indicate that increased investment, particularly in agriculture and manufacturing, significantly enhances economic output and improves the socio-economic well-being of the region. Additionally, the study highlights the critical role of government policies in creating a favorable investment climate and addressing structural bottlenecks. Recommendations are provided to optimize investment flows and ensure sustainable economic growth in Surkhandarya. The research contributes to regional economic planning by offering actionable insights for policymakers, investors, and stakeholders.

Key words: Econometric analysis, investments, foreign direct investment (FDI), economic growth, regional development, employment, industrial development, sustainable economic growth, investment climate, economic planning.

Annotatsiya: Ushbu tadqiqot Surxondaryo viloyati iqtisodiy tizimida investitsiyalarning o'rni va ta'sirini ekonometrik tahlil orqali o'rganadi. So'nggi o'n yillikdagi asosiy iqtisodiy ko'rsatkichlarni qamrab olgan ishonchli ma'lumotlar bazasi asosida, chet el to'g'ridan-to'g'ri investitsiyalari (ChTI), mahalliy investitsiyalar hamda mintaq iqtisodiy rivojlanishi o'rtasidagi bog'liqlik aniqlangan. Tadqiqotda yalpi ichki mahsulot o'sishi, bandlik va sanoat rivojlanishiga investitsiyalar ta'sirini o'lchash uchun kompleks ekonometrik model qo'llangan. Natijalarga ko'ra, ayniqsa qishloq xo'jaligi va ishlab chiqarish sohalaridagi investitsiyalar oshishi iqtisodiy natijalarni sezilarli yaxshilaydi va aholining ijtimoiy-iqtisodiy farovonligini oshiradi. Shuningdek, tadqiqot hukumat siyosatlarining qulay investitsiya muhiti yaratish va tarkibiy to'siqlarni bartaraf etishdagi muhim rolini ta'kidlaydi. Surxondaryoda investitsiya oqimini optimallashtirish va barqaror iqtisodiy o'sishni ta'minlash bo'yicha tavsiyalar ishlab chiqilgan. Tadqiqot natijalari siyosat yurituvchilar, investorlar va manfaatdor tomonlar uchun amaliy tavsiyalar orqali mintaqaviy iqtisodiy rejalashtirishga hissa qo'shadi.

Kalit so'zlar: ekonometrik tahlil, investitsiyalar, chet el to'g'ridan-to'g'ri investitsiyasi (ChTI), iqtisodiy o'sish, mintaqaviy rivojlanish, bandlik, sanoat rivojlanishi, barqaror iqtisodiy o'sish, investitsiya muhiti, iqtisodiy rejalashtirish.

Аннотация: В данном исследовании рассматриваются роль и влияние инвестиций на экономическую систему Сурхандарьинского региона с использованием эконометрического анализа. На основе надежной базы данных, охватывающей ключевые экономические показатели за последнее десятилетие, установлена взаимосвязь между прямыми иностранными инвестициями (ПИИ), внутренними инвестициями и экономическими результатами региона. Комплексная эконометрическая модель применена для количественной оценки влияния инвестиций на такие ключевые экономические переменные, как рост ВВП, занятость и развитие промышленности. Результаты показывают, что рост инвестиций, особенно в сельском хозяйстве и производственном секторе, значительно повышает экономический выпуск и улучшает социально-экономическое благосостояние региона. Кроме того, в исследовании подчеркивается важная роль государственной политики в создании благоприятного инвестиционного климата и устранении структурных узких мест. Даны рекомендации по оптимизации инвестиционных потоков и обеспечению устойчивого экономического роста в Сурхандарье. Исследование вносит вклад в региональное экономическое планирование, предлагая практические выводы для государственных органов, инвесторов и заинтересованных сторон.

Ключевые слова: эконометрический анализ, инвестиции, прямые иностранные инвестиции (ПИИ), экономический рост, региональное развитие, занятость, промышленное развитие, устойчивый экономический рост, инвестиционный климат, экономическое планирование.



INTRODUCTION

Any economic reform of a country cannot be implemented without investing in its production, market and social infrastructure. These are the most important foundations for ensuring the competitiveness of national production, without which the integration of our country into the world community cannot be implemented. Complex processes of reproduction are carried out only on the basis of investments. The more active it is, the faster the reproduction and the more effective market changes will occur. The scientifically based investment policy of the state plays a decisive role in ensuring the economy's recovery from any crisis and stabilizing its development. It determines the directions, structure, and real sources of investments, supports effective, rational measures to implement national, regional, and local technological and socio-economic programs, and reshapes processes at the macroeconomic and microeconomic levels.

At the current stage of economic development, regions begin to play an important economic, social and technological role in shaping the territorial infrastructure of each particular country. The stable development of regions can only be achieved with strong and continuous investment and innovation in the regional economy. Without a regional investment and innovation model of development, it is impossible to develop an effective strategy to address the contemporary challenges of global transnational changes that have emerged as a result of the use of hybrid technologies of the military-economic mix.

REVIEW OF LITERATURE ON THE SUBJECT

Investment-led economic growth has been widely studied in regional development literature. Barro and Sala-i-Martin in their seminal work *Economic Growth* emphasize that both domestic and foreign direct investment (FDI) play a critical role in enhancing regional GDP by increasing capital accumulation and facilitating technology transfer. Similarly, Solow's neoclassical growth model shows that investments in physical capital contribute to output growth, although the effects diminish over time due to diminishing returns.

Empirical studies focusing on developing regions support these theoretical foundations. For instance, Borensztein, De Gregorio, and Lee analyzed FDI impacts in developing economies and concluded that FDI contributes to economic growth when host countries have a minimum threshold of human capital. This finding is particularly relevant for regions like Surkhandarya, where educational attainment and workforce skill levels influence investment productivity.

In the Central Asian context, Mukhamediyev and colleagues analyzed the effect of investments on industrial growth in Kazakhstan, showing that targeted investments in manufacturing significantly boost regional economic performance. Likewise, Rahimov's research on Uzbekistan demonstrates that regional investment flows, especially into agriculture and infrastructure, directly impact employment rates and poverty reduction.

Furthermore, World Bank regional diagnostic reports underline that the effectiveness of investment in fostering economic growth depends heavily on institutional quality, governance, and infrastructural readiness. They note that areas with better governance frameworks attract more sustainable and diversified investments.

Recent econometric analyses, such as those by Esanov, Raiser, and Buiters, argue that structural reforms accompanying investment inflows amplify their positive effects on GDP growth and industrial development. This highlights the necessity for Surkhandarya to address structural bottlenecks alongside attracting capital inflows.

Overall, the reviewed literature emphasizes that while investments are key drivers of regional economic development, their success is contingent upon complementary factors such as human capital development, institutional efficiency, and strategic sectoral allocation.

RESEARCH METHODOLOGY

The study employs a quantitative research design using secondary data collected from the State Statistics Committee of Uzbekistan and regional investment reports from 2010 to 2023. Econometric analysis, including multiple regression models, was conducted to examine the impact of foreign and domestic investments on GDP growth, employment, and industrial output in Surkhandarya.

ANALYSIS AND RESULTS

In an era of limited financial resources and the constant dependence of the national economy on external debt, Surkhandarya region can be transformed into an economically promising region with the potential to implement rapid and effective changes associated with reform and further transformation of the regional para-



digm. This requires ensuring population growth in Surkhandarya region, attracting investments to introduce the latest technologies into priority sectors, developing external economic ties, increasing the production of high-quality goods and services, creating a modern industrial, transport and market infrastructure, and establishing efficient use of natural resources.

The process of attracting investments touches the deepest foundations of economic activity and determines the process of economic development. In the current conditions, investments are one of the main means of ensuring the necessary conditions for structural changes in the national economy, acceleration of technical progress, and growth of qualitative indicators of economic activity at the micro and macro levels.

Today, attracting investment is especially necessary for the activation and development of the economy, for those sectors that help eliminate social inequalities in society. This is, first of all, the production of food, necessary goods and services. It is not only about providing the population with necessary goods and services, but this process is also important in substituting them for imports, freeing up foreign exchange resources that are used to import consumer goods or raw materials for their processing. The effectiveness of regional development depends, first of all, on its economic potential. First of all, the economic potential of the region is considered an object of management. Managing the effectiveness of regional development is aimed at maximizing the rational use of economic potential and achieving maximum efficiency with limited resources. Secondly, the economic potential of a region is not a permanent value. If resource capacity changes due to the acquisition of new resources, for example, innovation, then it is very difficult to assess such a component of economic capacity and its value is not constant.

The economic potential of a region is a set of existing and potential resources necessary for its development, taking full advantage of the existing opportunities for the production of competitive products and fully meeting the needs of current and future generations. In turn, economic potential can be divided into a resource component, or the set of resources available for development, and an efficient component, or the ability of a region to effectively use available resources.

In general, investment contributes to the development of the economy of the country and its regions, the creation of new enterprises, ensuring the employment of the population and increasing its income. In this regard, we will consider an econometric assessment of the impact of investments on the economic system of the Surkhandarya region, which is the object of research. For this, we use data from the Surkhandarya regional statistical office for 2010-2022. In particular, for scenario 1, the following factors were selected as the effective factor: the gross regional product of the Surkhandarya region - GRP and the volume of industrial output affecting it - GIP, the volume of consumer goods - ITH, and investment in fixed capital - AKI. First, we determine the correlation coefficient of these selected factors with the resulting factor and between them (Table 1)

Table 1. Correlation coefficient of factors affecting the gross regional product of Surkhandarya region under scenario 1

	YHM	SMH	ITH	AKI
YHM	1			
SMH	0,989812	1		
ITH	0,986711	0,693918	1	
AKI	0,949361	0,743275	0,530876	1

If we consider the values in the table, the factors of the Surkhandarya region's gross regional product - GRP, industrial output - SMH ($r_{GRP, SMH}=0.989812$), consumer goods - ITH ($r_{GRP, ITH}=0.986711$) and investment in fixed capital - AKI ($r_{GRP, AKI}=0.949361$) are strongly correlated, and the condition between the factors is $\rho_{x1, x2} < 0.8$. In the absence of multicollinearity, the regression equation for the observed relationship can be determined using the EViews program (Table 2).

The following equation is obtained from the values of the coefficients given in the table data:

$$YHM = 2.3 * SMH + 4.03 * ITH + 0.4 * AKI + 2861.6 \quad (1)$$



Table 2. Multivariate regression equation of the gross regional product of Surkhandarya region under scenario 1

Dependent Variable: YHM

Method: Least Squares

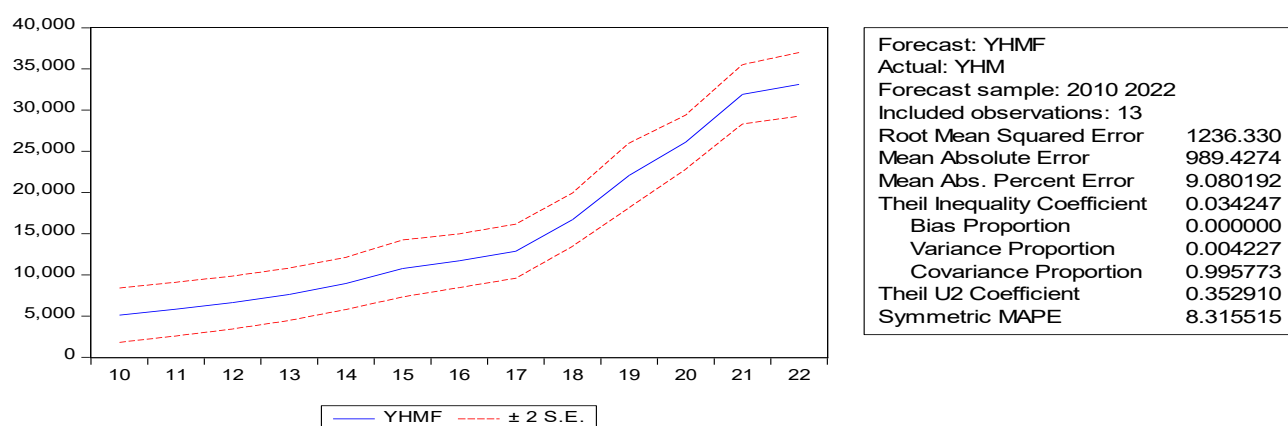
Date: 04/18/23 Time: 06:50

Sample: 2010 2022

Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMH	2.283553	1.942426	1.175619	0.0399
ITH	4.030377	4.873187	0.827052	0.0296
AKI	0.365501	0.275665	1.325888	0.0445
C	2861.577	875.6855	3,267814	0.0492
			$t_{jad}=2,26215716$	
R-squared	0.983235	Mean dependent var		15342.62
Adjusted R-squared	0.977646	S.D. dependent var		9938.245
S.E. of regression	1485.883	Akaike info criterion		17.69307
Sum squared resid	19870643	Schwarz criterion		17.86690
Log likelihood	-111.0049	Hannan-Quinn criter.		17.65734
F-statistic	175.9410	Durbin-Watson stat		1.941873
Prob(F-statistic)	0.000000	$F_{jad}=0,258896435$		

If we pay attention to the significance of the determined parameters of regression equation 1 according to statistical criteria t , $\alpha=0,05$ va $df=9$ In this case, the importance of all parameters based on the condition $this > t_{jad}$ is observed, since $t_{jad}=2.26215716$. However, to gain confidence in the significance of these selected factors for the actually observed process, retrospective quality criteria MAPE (Mean Absolute Percentage Error) and TIC (Theil Inequality Coefficient - an alternative measure of Thele forecast accuracy) are required (Figure 1).

Figure 1. Result of retrospective quality criteria for regression parameters 1¹

Based on the data presented in Figure 1, it can be emphasized that $MAPE=9.08$, which in turn indicates a high forecast accuracy of $MAPE=9.08 < 10\%$ and the fact that the coefficient $TIC=0.03 < 1$ tends to zero, which indicates the significance of all the parameters of regression equation 2.3.1. Now we check the significance of regression equation 2.3.1 using the Fisher criterion. Accordingly, considering that $\alpha=0.05$ and $k_1=9$; $k_2=3$, the Fisher value calculated is $F_{jad}=0.2589$, and the significance of the regression equation 2.3.1 based on the condition $F_{jad} < F_{his}$ is 175.9, and the absence of autocorrelation indicates the reliability and adequacy of the equation.

If we explain the equation, it was found that if the volume of industrial production and the volume of consumer goods in Surkhandarya region were to increase by 1.0 percent, then the gross regional product could

1 Author's Contribution



increase by 195.9 billion soums and 123.7 billion soums, respectively. It should be noted that by increasing the volume of investments in fixed capital by 1.0 percent, there is a possibility of increasing the gross regional product of Surkhondarya region by an additional 54.9 billion soums, which is a significant decrease in the level of efficiency compared to other selected factors, which requires the creation of investment projects for development in the region.

Now, according to scenario 2, using the statistical data of the Surkhondarya regional statistical office for 2010-2022, the following factors are selected as the effective factor: gross regional product - GRP, fixed capital investments - AKI, the number of regional labor resources - MRS, and the number of operating enterprises - IKS, which affect the change in GRP. The general and specific factors between them are selected first. correlations are identified (Table 3).

Table 3. Correlation coefficient of factors affecting the gross regional product of Surkhondarya region according to scenario 2

	YHM	AKI	MRS	IKS
YHM	1			
AKI	0,948033	1		
MRS	0,850692	0,727555	1	
IKS	0,884723	0,733982	0,559349	1

According to scenario 2 presented in Table 3, the Surkhondarya region has a very strong positive correlation with the regional fixed capital investment ratio (RHI, RHI=0.948033), the remaining regional labor resources (MRS, MRS=0.850692) and the number of operating enterprises (IKS, RHI=0.884723) are positively and strongly correlated. This, in turn, means that an increase in the number of operating enterprises with a large number of regional labor resources will lead to an increase in the gross regional product of the Surkhondarya region. As noted above, there is no multicollinearity between the factors under the condition $px_1, x_2 < 0.8$. This means that the next steps should be continued. To do this, we take the logarithm of all the factors with respect to the base 0, which is due to the different units of measurement of the selected factors, and using the values, we generate a nonlinear equation based on the continuation through the EViews program, and then check it based on the quality criteria (Table 4).

Table 4. 2 - Multivariate regression equation of the gross regional product of Surkhondarya region according to the scenario

Dependent Variable: LNYHM

Method: Least Squares

Date: 04/18/23 Time: 08:31

Sample: 2010 2022

Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAKI	0.161573	0.035206	4.589367	0.0013
LNMRS	5.968063	0.445869	13.38525	0.0000
LNIKS	0.502779	0.059403	8.463871	0.0000
C	-39.74871	3.214040	-12.33672	0.0000
R-squared	0.997421	Mean dependent var		9.424126
Adjusted R-squared	0.996561	S.D. dependent var		0.710304
S.E. of regression	0.041655	Akaike info criterion		-3.271122
Sum squared resid	0.015616	Schwarz criterion		-3.097292
Log likelihood	25.26229	Hannan-Quinn criter.		-3.306852
F-statistic	1160.082	Durbin-Watson stat		2.107995
Prob(F-statistic)	0.000000			

From the values of the coefficients given in the table data, the following equation is obtained:

$$\text{LnYHM} = 0.16\text{LnAKI} + 5.97\text{LnMRS} + 0.5\text{LnIKS} - 39.74871 \quad (2)$$

If we consider the parameters of this regression equation 2 in terms of their significance according to the t statistical criteria, then for $\alpha=0.05$ and $df=9$, the significance of all parameters follows from the equality of $t_{\text{jad}}=2.26215716$ and the equality of this $>t_{\text{Jad}}$. In this case, we can confirm the significance of the selected factors and parameters using the retrospective quality criteria MAPE and TIC (Figure 2).

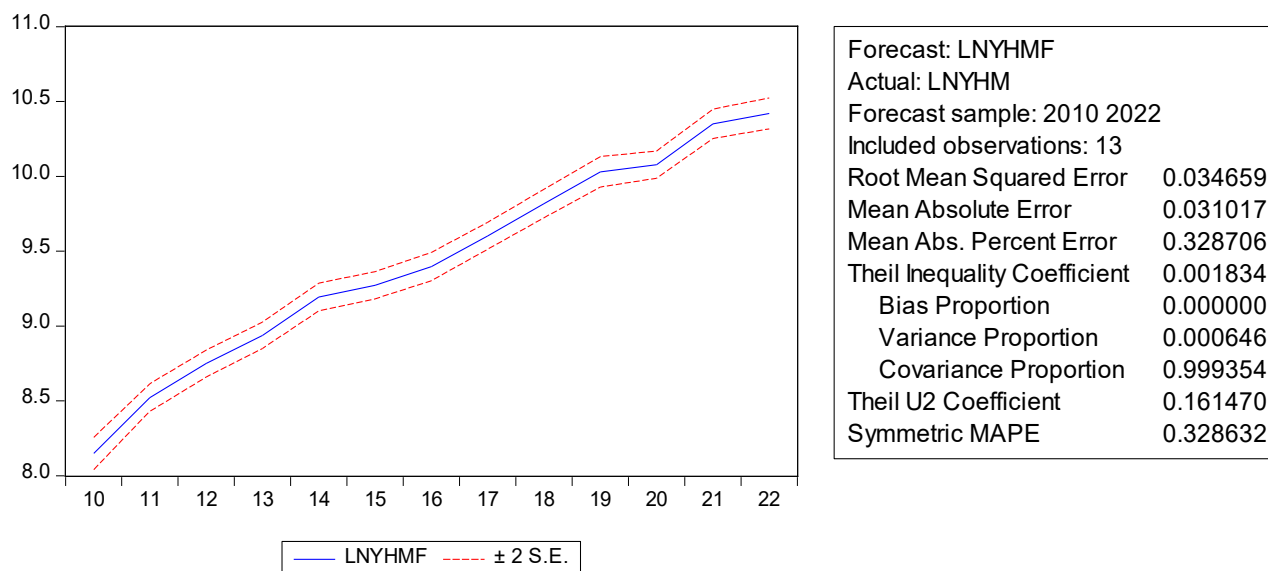


Figure 2. 2-Result of retrospective quality criteria of regression parameters²

Based on the data presented in Figure 2.3.2, it can be emphasized that $\text{MAPE}=0.329$, which in turn indicates a high forecast accuracy of $\text{MAPE}=0.329<10\%$ and the fact that the coefficient $\text{TIC}=0.002<1$ tends to zero indicates the significance of all the parameters of regression equation 2.3.2. In order to simplify the mathematical rules and calculation processes and achieve accuracy of results, the regression equation 2.3.2 obtained above is potentiated and the following equation is obtained:

$$YHM = \frac{AKI^{0.16} * MRS^{5.97} * IKS^{0.5}}{e^{39.74871}} \quad (2^*)$$

The resulting regression equation 2* is truly significant at $\alpha=0.05$ and $k1=9$; Given that $F_{\text{jad}}=0.2589$ for $k2=3$, the Fisher value $F_{\text{his}}=1160.1$, the significance of the regression equation 2* based on the condition $F_{\text{jad}}<F_{\text{his}}$, and the absence of autocorrelation, $DW=2.108$, indicate the reliability and adequacy of the equation.

It was found that if, according to Scenario 2, the volume of fixed capital investments and the number of manufacturing enterprises in Surkhondarya region were increased by 1.0 percent, the regional gross regional product could be increased by an additional 63.8 billion soums and 199.6 billion soums, respectively. If the current number of labor resources were increased by 1,000 people, the gross regional product would be increased by an additional 160.4 billion soums. According to the results obtained, it is appropriate to organize new production enterprises and ensure the availability of labor resources in Surkhondarya region, and to direct the attracted investments primarily to the organization of new enterprises and human capital. In general, the main advantages of foreign or domestic investment for the economy are as follows:

- the opportunity to use modern technologies, tools and equipment;
- attracting financial resources and creating new jobs;
- strengthening internal competition and increasing tax revenues to the budget.

In order to improve the investment climate for the development of the economy of the Republic of Uzbekistan, it is necessary to implement the following measures:

- ensure the effective functioning of the legal and judicial sectors;
- eliminate corruption at all levels of government;

2 Muallif ishlanmasi



- liberalize business activity by reducing the level of bureaucracy and simplifying the regulatory environment;
- increase the demand of citizens for products of the Republic of Uzbekistan;
- reduce the fiscal burden on business and reduce taxes;
- to provide conditions for the rapid development of the country's securities market, the development of modern exchange instruments, exchange infrastructure.

The priority tasks of increasing foreign investment are:

- 1) reforms in the economic sphere;
- 2) introduction of new technologies in production;
- 3) production of consumer goods;
- 4) replacing imports with locally produced goods.

However, it should be emphasized that the goals of investors appearing on the national market often contradict the domestic economic development program. Investors are interested in projects that are funded for the shortest possible time and that will yield results in the shortest possible time. The Republic of Uzbekistan's cheap access to the raw materials market, scientific and technical base, and qualified personnel have also attracted foreign investors. The provision of incentives for small businesses and private entrepreneurship, the possibility of implementing previously developed investment projects, which require the organization of special information and economic departments on a regional scale, will help improve investment activity.

As a result, the implementation of these measures will provide a favorable investment environment for attracting foreign capital in conditions of insufficient domestic financing sources, and will also serve to revitalize and improve economic, in particular, investment and innovation activity. On this basis, creating social conditions will be possible thanks to decisive, comprehensive, rapid and consistent market reforms that encourage entrepreneurial initiative, ensure a competitive environment, and provide incentives for the effective development of the economy.

CONCLUSIONS AND SUGGESTIONS

The econometric analysis conducted in this study underscores the significant impact of investments on the economic system of the Surkhandarya region. Both foreign direct investment (FDI) and domestic investment have been found to contribute positively to key economic indicators such as GDP growth, employment generation, and industrial diversification. The results confirm that targeted investments, particularly in sectors like agriculture, manufacturing, and infrastructure, serve as vital drivers of economic development in the region.

However, the analysis also reveals the presence of structural challenges, including inadequate infrastructure, limited access to financial resources, and policy inefficiencies, which hinder the optimal utilization of investments. Addressing these barriers requires concerted efforts from policymakers, local authorities, and private stakeholders to create a more favorable investment climate.

The study recommends enhancing public-private partnerships, improving investment incentives, and promoting regional integration to attract and sustain investment flows. By aligning investment strategies with regional economic priorities, Surkhandarya can leverage its unique geographic and economic potential to achieve long-term, inclusive growth.

Overall, this research provides actionable insights for decision-makers to design effective policies and strategies that optimize the role of investments in fostering economic development in the Surkhandarya region. Future studies could expand on these findings by incorporating micro-level data and exploring the socio-environmental impacts of investment-led growth.

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