Impact of Innovative Technologies on Efficiency in Foreign Economic Activity

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Abstract- **This study examines the role of innovative technologies in Uzbekistan's foreign economic activities. The impact of digital technologies, artificial intelligence, blockchain, and e-commerce on international trade development is thoroughly analyzed, with an empirical evaluation of their effectiveness in export and import operations. The findings indicate that innovative technologies enhance export growth, improve customs processes, and attract foreign investments. Based on advanced international practices, strategic recommendations for developing Uzbekistan's digital economy are proposed. This research highlights the significance of innovation in increasing the efficiency of foreign economic activities.**

***Keywords*:** Foreign economic activity, innovative technologies, digital economy, customs system, export, Uzbekistan.

1. INTRODUCTION

The rapid development of globalization and technological progress has led to the transition of international economic relations to a new level. Modern innovative technologies provide countries, enterprises, and investors participating in foreign economic activity with the opportunity to increase efficiency, reduce operating costs, and strengthen competitiveness[1]. In particular, innovative solutions such as digital technologies, artificial intelligence (AI), blockchain, and IoT have a significant impact on the dynamics of international trade and investment.

At the same time, how are innovative technologies changing international trade relations?, how are they affecting the effectiveness of foreign economic activity?, how is this process occurring in the case of Uzbekistan? The introduction of innovative technologies in Uzbekistan's foreign economic activity, in particular blockchain, artificial intelligence, and e-commerce platforms, has become an important factor in increasing international competitiveness. However, the insufficient development of digital infrastructure in the country, the weak approach of small and medium-sized businesses to technological integration, and the limited flow of foreign investment are still among the pressing problems. Studies show that the degree to which countries integrate innovative technologies into export-import operations determines their position in the global economic system[2][8].

Uzbekistan also pays great attention to the development of the digital economy and innovative technologies. Given the growing role of digital technologies in international trade, the government of Uzbekistan is implementing comprehensive reforms within the framework of the "Digital Uzbekistan - 2030" strategy to automate customs procedures, establish electronic contracting systems, and develop e-commerce [22][23].

World experience shows that innovative technologies play an important role in increasing the efficiency of foreign economic activity in the following areas:

- Rapidity and transparency of trade operations - Artificial intelligence and blockchain technologies simplify international agreements and customs procedures[4][9].
- Cost Reduction - Automated logistics and electronic payment systems significantly reduce overhead costs in foreign trade[7][12].
- Expansion of markets - E-commerce and digital platforms increase access to the global market for small and medium-sized businesses[5][18].
- Increased investment attractiveness - Innovative technologies are an important factor in attracting foreign investment [13][17].

This research is aimed at the theoretical and empirical study of the influence of innovative technologies on the effectiveness of foreign economic activity. Within the framework of the study, the influence of international experience and innovative technologies on export-import operations is analyzed using the example of Uzbekistan. The research is mainly conducted within the framework of Schumpeter's innovation theory [13] and Romer's endogenous

growth model [11].

The results of this study will allow for the development of effective strategies for the widespread introduction of innovative technologies into the economy, the deepening of Uzbekistan's international economic integration, and the promotion of important proposals for the formation of a favorable investment climate for foreign investors.

2. LITERATURE REVIEW

This section provides a review of 24 selected scientific literature and official reports on the topic of the influence of innovative technologies on the effectiveness of foreign economic activity. The literature is analyzed on the basis of theoretical foundations, empirical research, international reports, and statistical data studied on the example of Uzbekistan.

Schumpeter's theory of innovation emphasizes the decisive role of technological innovations in economic development. Innovations expand access to the international market by increasing the competitiveness of enterprises [13]. Romer's endogenous growth model shows that technological progress is a determining factor for the long-term economic growth of the state and businesses [11].

Porter's theory of competitive advantage substantiates the role of innovation in ensuring the success of the national economy in foreign trade.

In his opinion, the integration of innovative technologies into export-import operations increases the economic competitiveness of states [12].

According to research by Akcigit and Melitz, digital transformation significantly increases the efficiency of international trade, especially through automated customs systems and digital contracting [6].

The use of digital technologies and artificial intelligence in the global economy serves to optimize international trade processes [3]. Intelligent supply chains (smart supply chains) developed on the basis of artificial intelligence (AI) are speeding up transaction processes, reducing the operating costs of global trade[4].

According to research conducted by McKinsey & Company, countries and companies that have widely implemented digital technologies are gaining dominance in the international market [17]. For example, global companies are implementing transparent and secure payment systems through blockchain technologies, which increases the security of foreign trade operations.

The World Bank's Innovation and Economic Efficiency Report found that countries that implement innovations have high export volumes. The results of this study show that the impact of innovative technologies on economic efficiency is directly related to the dynamics of foreign investment and foreign trade [2].

Hasanov analyzed the interrelationship between sustainable economic development and innovative technologies. According to him, the digital economy and green technologies are becoming increasingly important in international trade operations [9].

According to the OECD's 2024 Economic Development Report, countries that have implemented digital transformation and innovation are more successful in international markets [15]. The World Bank's 2024 Innovation Report notes that the use of AI and IoT technologies in global trade is increasing the volume of foreign investment [16].

The WTO 2024 report provides detailed information on how innovations affect the effectiveness of international trade operations. In particular, examples are given of the implementation of customs systems based on blockchain and the automation of cross-border payments through e-commerce [18].

According to the IMF 2024 report, the link between innovation and international trade is growing. This report also examines the impact of digital currencies and cryptocurrencies on international payment systems [20].

UNCTAD's 2024 digital economy research examined in detail the impact of innovative technologies on sustainable development. This report analyzes the advantages of developed trading systems based on e-commerce, artificial intelligence, and blockchain technologies [19].

The process of digital transformation is rapidly developing in the foreign economic activity of the Republic of Uzbekistan. According to official statistics, Uzbekistan's IT service exports amounted to $200 million in 2024 [24].

According to the Ministry of Investments and Foreign Trade of the Republic of Uzbekistan, in recent years, customs systems have been automated, and electronic documentation of export and import operations has been introduced [23]. According to IT Park, Uzbekistan's export of digital services increased significantly in 2024, which proves the positive impact of innovative technologies on foreign trade processes [24].

3. METHODOLOGY

This research is aimed at studying the influence of innovative technologies on the effectiveness of foreign economic activity and is carried out on the basis of theoretical and empirical approaches. The research is conducted using the example of the Republic of Uzbekistan and is analyzed based on statistical data, international experience, and methods of economic modeling.

A combined approach is used in the research. The theoretical analysis analyzes the impact of innovations on international trade based on Schumpeter's innovation theory and Romer's endogenous growth model. In empirical analysis, a statistical analysis is carried out based on Uzbekistan's export-import data, exports of IT services, and investment flows. Within the framework of the comparative analysis, the effectiveness of the digital economy and foreign trade of Uzbekistan and other developing countries is compared.

Through econometric modeling, the relationship between foreign economic activity and innovative technologies is studied using regression analysis.

Research methods include the following areas. In statistical analysis, Uzbekistan's foreign trade indicators, the volume of IT exports, and the dynamics of foreign direct investment flows are analyzed using statistical methods. The impact of digital trade and innovation on economic efficiency is analyzed based on time series. The role of innovations in the entry of small and medium-sized businesses into international markets is also assessed based on statistical data.

Within the framework of econometric modeling, the relationship between foreign economic activity and innovative technologies is determined using OLS regression analysis.

The Difference-in-Difference (DiD) model analyzes how much trade efficiency has changed after the introduction of innovative technologies in Uzbekistan. Using the Panel Data Analysis method, the impact of innovative technologies in Uzbekistan and other developing countries is compared.

Within the framework of qualitative analysis, the government's policy of promoting innovative technologies is assessed. Innovative trade strategies of Uzbekistan and other developing countries are compared.

The scope of the research includes the following areas. The period covers 2015-2024, and the dynamics of innovative technologies and foreign trade of Uzbekistan is studied. Uzbekistan and developing countries with similar economic structures are selected as territorial coverage. In terms of industrial sectors, IT services, e-commerce, blockchain-based customs systems, and economic sectors where artificial intelligence has been implemented are analyzed.

4. ANALYSIS AND RESULTS

The impact of innovative technologies on the foreign economic activity of the Republic of Uzbekistan in the period 2010-2024 is assessed based on empirical and statistical analysis.

Uzbekistan's foreign economic activity has undergone significant changes over the past 14 years. According to the Statistics Agency and the Ministry of Investments and Foreign Trade:

- Exports amounted to US$7.5 billion in 2010 and reached US$37.2 billion by 2024, a 4.9-fold increase [22][23].
- IT service exports grew sixfold between 2015 and 2024, reaching $160 million [24].
- The share of exports of high-tech products in 2024 amounted to 12.3%, which indicates a positive trend compared to previous years [23].
- As a result of the automation of the customs system, export-import processes have accelerated; if in 2010 customs clearance took an average of 7 days, then by 2024 this figure decreased to 2.5 days [18].
- Impact of innovative technologies on sales effectiveness:
- Digitalization of the customs system - after the introduction of the electronic customs system ("Single Window") in Uzbekistan, the average costs of export operations decreased by 22% [18][23].
- Development of e-commerce - in 2024, the volume of e-commerce exports of Uzbekistan increased 3.1 times, which facilitated the entry of small and medium-sized businesses into international markets [24].
- Artificial intelligence and automated logistics - supply chain analysis based on AI helped optimize import volumes. The efficiency of advance delivery time forecasting using AI has increased by 35%[6][7].

The relationship between investments and innovative technologies:

Foreign Direct Investment (FDI) Flow and Innovation - In 2024, the volume of FDI attracted to Uzbekistan amounted to $10.8 billion, which is 2.4 times more than in 2010 [23].

- Investments in digital transformation - government investments in the IT sector reached $500 million in 2024 [24].

Global trends and the experience of Uzbekistan - The results of research conducted by McKinsey & Company show that countries and companies that have attracted investments in innovation are gaining dominance in the international market [17].

To analyze the relationship between Uzbekistan's innovative technologies and foreign economic activity, OLS (Ordinary Least Squares) regression analysis, the Difference-in-Difference (DiD) model, and Panel Data Analysis were used.

The following key factors were assessed using the OLS model:

$$EXPORT = \beta_0 + \beta_1 IT_{INVEST} + \beta_2 E_{COMMERCE} + \beta_3 CUSTOM_{DIGIT} + \beta_4 FDI + \varepsilon$$

Variable explanation:

- EXPORT - Uzbekistan's export volume (expressed in US dollars)
- IT_INVEST - Investments in digital technologies (USD)
- E_COMMERCE - Share of e-commerce (%)
- CUSTOM_DIGIT - Level of digitalization of the customs system (%)
- FDI - Foreign Direct Investments (USD)
- ε - Random error

Table 1: OLS regression results

Variable	**Coefficient**	**t-Statistics**	**P-value**
IT_INVEST	0.29	4.02	0.000
E_COMMERCE	0.21	3.54	0.001
CUSTOM_DIGIT	0.33	4.89	0.000
FDI	0.27	3.92	0.001
R^2 = 0.87	F-Stat = 25.3	P = 0.000	

Analysis of the results:

- The volume of IT investments had a positive impact on exports of 29% [6][7].
- An increase in the share of e-commerce increased the volume of foreign trade by 21%[5].
- Digitalization of the customs system increased the efficiency of foreign economic activity by 33% [18][23].
- FDI inflows were associated with technological development, increasing export volumes by 27% [24].

DiD model Analysis of the results used to assess changes in export-import volumes after the introduction of innovative technologies in Uzbekistan:

- Between 2010 and 2024, Uzbekistan's export volume increased 4.9 times due to innovative technologies [22][23].
- Kazakhstan's exports grew slower than in Uzbekistan, which proves the impact of innovations on exports [12].

Table 2: Panel data analysis results

Goverment	**Level of customs digitalization (%)**	**Export volume (billion $)**	**Impact of technologies (%)**
Uzbekistan	85%	37.2	+33%
Kazakhstan	75%	62.1	+20%
Turkey	90%	278.4	+42%
Vietnam	88%	405.3	+39%

Panel data analysis results:

- Countries that implemented technological modernization increased their export volumes faster [12][18].
- Automation of customs processes contributes to increasing the efficiency of foreign economic activity [23].

5. CONCLUSIONS

In the foreign economic activity of the Republic of Uzbekistan, innovative technologies play an important role in increasing efficiency, strengthening the integration of the national economy into the processes of globalization. The 4.9-fold increase in export volume between 2010-2024, the increase in the speed and transparency of trade operations as a result of the digitalization of the customs system, and the expansion of opportunities for small and medium-sized businesses to enter international markets through the development of e-commerce clearly demonstrated the

effectiveness of innovative approaches.

In the future, through further improvement of the foreign trade system and expansion of innovations, a stable increase in export volumes, strengthening international competitiveness and attracting foreign investment will lead to new high results. Through the accelerated introduction of innovative technologies in Uzbekistan's foreign economic activity, it will be possible to increase trade efficiency, further expand export volumes, and increase investment attractiveness. To this end, it is important to increase the share of FDI directed by the state to the IT sector, strengthen the e-commerce infrastructure, and introduce blockchain technologies. Based on the experience of Turkey and Vietnam, subsidizing digital services for small and medium-sized businesses will also be an effective direction.

This process will be further developed based on the following priority areas:

- Developing the export of IT services and strengthening the digital ecosystem will increase Uzbekistan's technological potential and ensure its transformation into a regional IT hub.
- The creation of innovative technology parks and free economic zones for foreign investment will create a more attractive environment for international investors and accelerate the pace of technological development.
- Studying and implementing the best practices of Turkey and Vietnam will raise Uzbekistan's foreign economic activity to a new level and make it one of the leading players in the international market.

Thanks to the accelerated introduction of innovative technologies, new opportunities will open up in Uzbekistan's foreign economic activity, export volumes will increase, the investment climate will improve, and reliable cooperation in the global trading system will expand. This approach will ensure the sustainable development of the country's economy and raise it to a new level.

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