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ANALYSIS OF THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE COUNTRY'S ECONOMY

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Abstract
In this reasearch, the impact of the formation of artificial intelligence on the country's economy was analyzed. Empirical analysis of the relationship between the gross domestic product of the top 10 countries and the export and import of artificial intelligence software products and the annual change in the volume of products was carried out using the Random Effects REE and Pooles OLS models.

Keywords
Artificial intelligence, digital ecosystem, digital platforms, GDP, export, import, software products.

Introduction

Today, the need for various innovations and artificial intelligence is increasing day by day. Accordingly, important decisions are being made in all countries about the transition to smart programs and the rapid development of artificial intelligence on a large scale.

According to the decree of the President of the Republic of Uzbekistan No. PQ-6079, the "Digital Uzbekistan-2030" strategy was adopted. The priority areas of digital economy development are as follows:

In order to develop digital technologies in the real sector of the economy, the following measures are implemented:

Harmonization of programs for the introduction of modern information technologies in industrial enterprises with programs for technological re-equipment of these enterprises;

Ensuring automation and management of all stages of enterprise supply, as well as reducing logistics and procurement costs;

Step-by-step automation of workplaces and robotization of production processes, as well as the introduction of artificial intelligence technologies;

Improvement of interaction mechanisms with customers (clients) in order to increase the volume of trade and improve customer service;

Improving and updating the legal basis of e-commerce development, as well as existing standards and e-commerce rules, in order to comply with international e-commerce standards and modern information security requirements;

Automation of production and management processes (ERP, MES, SCADA, etc.), robotization, "IoT products," and "artificial intelligence" technologies introduced in industrial enterprises will include the software product part by 2027 and the hardware part by 2030. localization based on a private partnership;

In the decision of the President of the Republic of Uzbekistan dated February 17, 2021, "On measures to create conditions for the rapid introduction of artificial intelligence technologies," PQ-4996

Organization of scientific research aimed at the comprehensive implementation of the "Digital Uzbekistan: 2030" strategy and the introduction of artificial intelligence technologies in the economic sectors, social sphere, and state management system;

Conducting fundamental and applied scientific research in the field of artificial intelligence, forming a scientific ecosystem for the development of digital technologies;

Development of innovative products and their models, algorithms, and software for automation of management and production processes based on artificial intelligence technologies;

Establishing cooperation with leading foreign innovative and scientific institutions for the development of artificial intelligence technologies and implementing joint projects.

The purpose of this is to develop the economy of our country, improve the lifestyle of the population, bring our industry to the level of foreign standards, expand production capacity, and implement important innovative projects in all areas (Decision, 2021).

Literature analysis

Artificial intelligence is becoming a necessity for business operations and businesses that intend to maintain a competitive edge in the marketplace. Artificial intelligence has more decision-making capabilities than traditional software (Uzialko, A. C., 2019). AI system can handle most of the software packages and their management without human intervention. This next generation of electronic automation—the use of big data, analytics, and artificial intelligence—is one of the most important factors in the development of digitization in industry (Y. A. Savinov and Ye. V. Taranovskaya, 2020). Although the benefits will be felt globally, North America and China are expected to gain the most from AI technology (Marcin Szczepański, Members' Research Service 2019).

The economic impact of artificial intelligence will depend on:

1. Increased efficiency as a result of automation of business processes (including the use of robots and autonomous vehicles).
2. Increasing the productivity of enterprises by augmenting the existing labor force with the help of artificial intelligence technologies (assistive and augmented intelligence).
3. Increased consumer demand as a result of the availability of personalized and/or high-quality AI-enhanced products and services.

Increasing labor productivity accounts for more than half of all economic gains from artificial intelligence between now and 2030, with the rest coming from increased consumer demand resulting from product improvements (Kuprevich T.S., 2020).

The main advantages of using artificial intelligence in the production process are:

The ability to increase the competitiveness of products. Artificial intelligence can significantly reduce the cost of production. As a result, the demand to attract contractors to perform outsourcing operations is decreasing, and the most important factor in locating industrial facilities is proximity to production resources rather than proximity to trade markets.

Ability to increase labor productivity by reducing the use of manual labor and expanding automated production.

Increase the profitability of business activities by increasing the efficiency of the production process, reducing downtime, and reducing capital costs over time.

According to Statista, the size of the artificial intelligence (AI) market worldwide was projected to grow from 2015 to 2024. In 2015, the global artificial intelligence market generated revenue of 126 billion US dollars. By 2020, it will reach 1214 billion US dollars (Figure 1). It can be seen that the artificial intelligence market revenue will grow from 2015 to 2024. From 2015 to 2021, it has increased 10 times. So, 126 billion US dollars is 24% of 3061 billion US dollars.

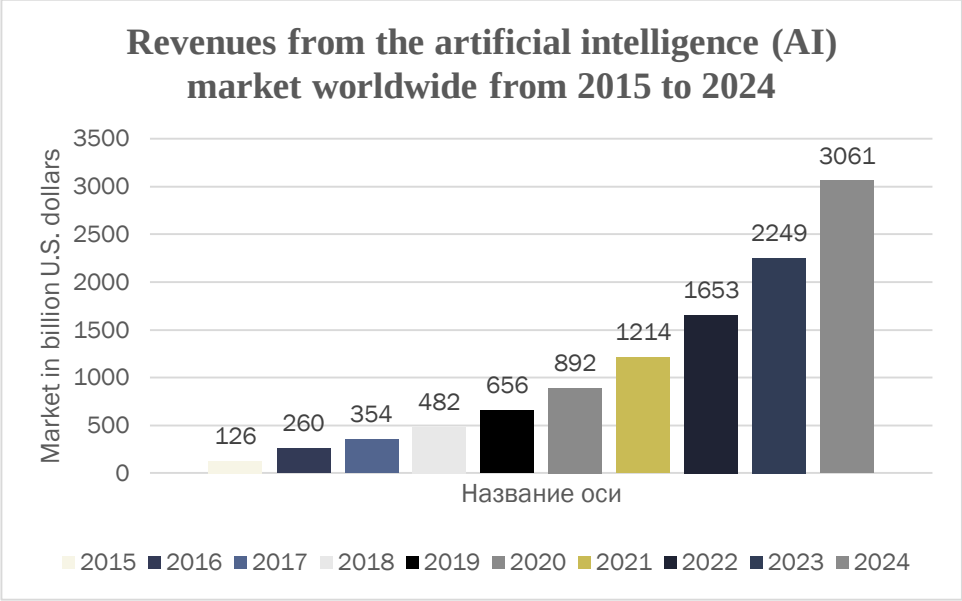

Figure 1. Global artificial intelligence (AI) market revenue (in USD billion) 2015 to 2024

Sourse: https://www.statista.com/statistics/621035/worldwide-artificial-intelligence-market-revenue/

Methodology

We will conduct an econometric analysis based on the data collected during the research. In this, based on WTO World Trade Statistics data, we present the annual percentage change in export and import of software products among the Top 10

countries in the period from 2017 to 2019, and the impact on GDP is expressed as a result factor. The percentage of GDP is based on data from the Trading Economics website. In this study, the panel was performed using random effects estimators and pooled OLS models.

The random effects regression model is used to estimate the effect of individual characteristics, such as intelligence and acuity, which cannot be measured in nature. Such individual-specific results are often found in panel data studies. Along with the fixed effect regression model, the random effects model is a common method for examining the effect of individual characteristics on the response variable of a panel data set (shown in Appendix 1).

Along with fixed effects, random effects, and random coefficients models, the pooled OLS regression model remains a common model for panel data sets. In fact, in many panel datasets, the pooled OLSR model is often used as a reference or base model against which to compare the performance of other models. Accordingly, Y-o-Y% growth of GDP appears to be linearly related to Y-o-Y% growth of gross capital formation, so we adopt the following linear functional form for our regression model for each unit (country): Y-o-Y% growth of GDP appears to be linearly related to Y-o-Y% growth of gross capital formation, so we adopt the following linear functional form for our regression model for each unit (country):

$$\boldsymbol{Y_{it} = X_{it}B_{it} + e_{it}} \qquad \textbf{(1.1)}$$

In the above equation, all variables are matrices of a certain size. Assuming n units, k regression variables per unit, and a time period of T per unit, the dimensions of each matrix variable in the above equation are:

$\boldsymbol{Y_{it}}$- *it* solution variable per unit (GDP growth). It is a column vector of size [T x 1].

$\boldsymbol{X_{it}}$- *[T x k]* matrix of regression variables of size .

$\boldsymbol{B_{it}}$ - *[k x 1]* a matrix of coefficients of size containing the total value of the coefficients for the k regression variables in X_i.

$\boldsymbol{e_{it}}$- *[T x 1]* A column vector of size, one error for each time period T, contains the error terms.

Analysis and results

Based on data from the World Trade Statistics and Trading Economics sites, the relationship between the gross domestic product of the top 10 countries engaged in the export and import of software products and the annual change in the volume of these products was studied.

Table 1

Random effects regression model

```
Random-effects GLS regression                   Number of obs     =         30
Group variable: i                               Number of groups  =         10

R-sq:                                           Obs per group:
     within  = 0.0040                                         min =          3
     between = 0.0303                                         avg =        3.0
     overall = 0.0131                                         max =          3

                                                Wald chi2(1)      =       0.17
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.6794
theta          = .59000701
```

GDP_growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
program_products_export	.009431	.022819	0.41	0.679	-.0352933	.0541554
_cons	3.865162	.7056038	5.48	0.000	2.482204	5.24812
sigma_u	1.9172943					
sigma_e	1.4927558					
rho	.6225961	(fraction of variance due to u_i)				

These are the indicators of the regression equation according to the random effects estimator (REE) model, according to which a 1% increase in the average export of software products in the region leads to a change in the average GDP in the region from 0.035% to 0.054% according to the REE model. Based on the data from this panel, when analyzed according to the pooled OLS estimator model, an equation was created based on the following indicators:.

Table 2

Pooled OLS model

Source	SS	df	MS	Number of obs	=	30
				F(1, 28)	=	0.37
Model	1.9821066	1	1.9821066	Prob > F	=	0.5478
Residual	149.885763	28	5.35306297	R-squared	=	0.0131
				Adj R-squared	=	-0.0222
Total	151.86787	29	5.2368231	Root MSE	=	2.3137

GDP_growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
program_products_export	.0183891	.0302202	0.61	0.548	-.0435143	.0802925
_cons	3.761846	.5476456	6.87	0.000	2.640045	4.883647

$$Y_{it} = 0.018X_{it} + 3.76. \qquad (1.2)$$

In here,

Y_{it}– GDP growth rate of countries exporting software products (in percent);

X_{it} - growth rate of software product exports (in percent)

Thus, the impact of the annual change in the export and import of software products by the countries on GDP was analyzed. Using random effects estimators and pooled OLS models, the equation of the country's GDP growth model was developed. The reliability of this developed model was checked using the Fisher test (Ft<Fh). As can be seen from the above equation, if the export volume of software products in the top 10 countries exporting software products increases by 1%, it will also lead to an increase in GDP of 0.018%.

Above, we analysed how exports of this sector affect their GDP in the top 10 software exporting countries using REE and pooled OLS estimator models. Now let's see how this situation is based on the top 10 countries that import software products.

Table 3

Fisher's test for the random effects estimator model

Source	SS	df	MS	Number of obs	=	30
				F(1, 28)	=	13.38
Model	46.7430299	1	46.7430299	Prob > F	=	0.0010
Residual	97.8487567	28	3.49459845	R-squared	=	0.3233
				Adj R-squared	=	0.2991
Total	144.591787	29	4.98592368	Root MSE	=	1.8694

GDP_growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
program_products_import	.0919856	.0251513	3.66	0.001	.0404655	.1435056
_cons	1.650464	.4849916	3.40	0.002	.6570039	2.643924

This model, developed with the help of a random effects estimator, successfully passed Fisher's reliability test of models. F = 0.0010 (which should actually be less than 0.05).

$$Y_{it} = 0.091X_{it} + 1.65 \qquad (1.3)$$

In here,

Y_{it} - GDP growth rate of countries importing software products (in percent);

X_{it} - growth rate of software product imports (in percent)

From the above equation, it can be said that a one percent increase in the volume of imports of software products will lead to an increase of 0.091 percent in the GDP of countries that import software products, if other indicators do not change. It can be stated with confidence that according to this model, a 1% increase in the average software product import in the region leads to a change in the average GDP in the region from 0.0404 percent to 0.1435 percent, according to the REE model.

Table 4

Random effects model

```
Random-effects GLS regression                   Number of obs     =         30
Group variable: i                               Number of groups  =         10

R-sq:                                           Obs per group:
     within  = 0.0192                                         min =          3
     between = 0.5512                                         avg =        3.0
     overall = 0.3233                                         max =          3

                                                Wald chi2(1)      =       2.27
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.1318
theta          = .68612134
```

GDP_growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
program_products_import	.0278448	.018478	1.51	0.132	-.0083714	.0640611
_cons	2.529192	.6034825	4.19	0.000	1.346389	3.711996
sigma_u	1.4837744					
sigma_e	.84959548					
rho	.75309134	(fraction of variance due to u_i)				

Based on the data from this panel, when analyzed according to the pooled OLS estimator model, one more equation was created based on the following indicators:

$$Y_{it} = 0.028X_{it} + 2,53. \qquad (1.4)$$

In here,

Y_{it} - GDP growth rate of countries importing software products (in percent);

X_{it} – growth rate of software products imports (in percent)

The reliability of the developed model was checked using Fisher's test (Ft<Fh). As can be seen from the above equation, if the volume of software products imported increases by 1% in the top 10 countries that import software products, the GDP of these countries will also increase by 0.028%.

As a result of the analyses carried out in the pooled OLS estimator model based on panel data, the impact of the import of these products on the GDP of the top 10 countries that import software products has a slightly greater impact than the impact on the GDP of the countries that export these products. That is, buyers of software products are getting more profit than their sellers. The volume of software products affects the volume of GDP by 0.018% for exporters and 0.028% for importers.

Summary

Digital ecosystems have changed the way consumers find, evaluate, and buy goods and services by providing access to a diverse set of services through a common access point. For example, WeChat users in China can use the same app not only to exchange messages but also to book a taxi, order food, schedule a massage, play games, send money to a contact, and access a personal line of credit. Similarly, businesses and "super apps" across countries are incorporating financial services and products into their journeys, providing engaging experiences for customers. As a

result, businesses must rethink how they participate in digital ecosystems and use SI to take advantage of the full power of data available from these new sources.

Currently, in the enterprises of our country, for example, banks are providing online services through chatbots, smart offices, payment systems, and mobile applications. The smart office is equipped with a card machine, an automated deposit machine (ADM), a video teller machine (VTM), an ATM, an infokiosk, a "reception robot," and touchscreen devices. Also, in the bank, the robot answers all the questions of the clients and provides information about all types of services that can be performed here, promotions, and news. It provides detailed information about the possibilities of using the provided services and the procedure for using the devices. Customers will be able to get their information (which will appear on this robot's screen) by visiting their web pages.

For example, Fintex systems at UzMilliybank's "Smart Office," which provides customer service without the participation of employees at Agrobank, provide automated services for all types of banking operations. Banks in Uzbekistan are using artificial intelligence to identify and authenticate customers, emulate live employees through chatbots and voice assistants, deepen customer relationships, and provide personalized insights and recommendations.

The strategies used by countries undergoing transformation to support artificial intelligence have shown how to make the most of the opportunity. These strategies emphasize the need for a holistic SI strategy that spans the enterprise's business lines, accessible data, relationships with external partners, and skilled personnel.

According to PwC research in Figure 2, some economies are more profitable than others, both in absolute and relative terms. China and North America will see the biggest impact. All areas of the global economy will benefit from artificial intelligence. North America and China are making the biggest economic gains, with AI increasing GDP by 14.5% and 26.1%, respectively. Developing countries will experience slow growth as the adoption rate of AI technologies is expected to be much lower. In this regard, the level of influence of Latin American countries remains low, affecting 5.4% of GDP. China has the highest level of influence, equal to 7 trillion US dollars.

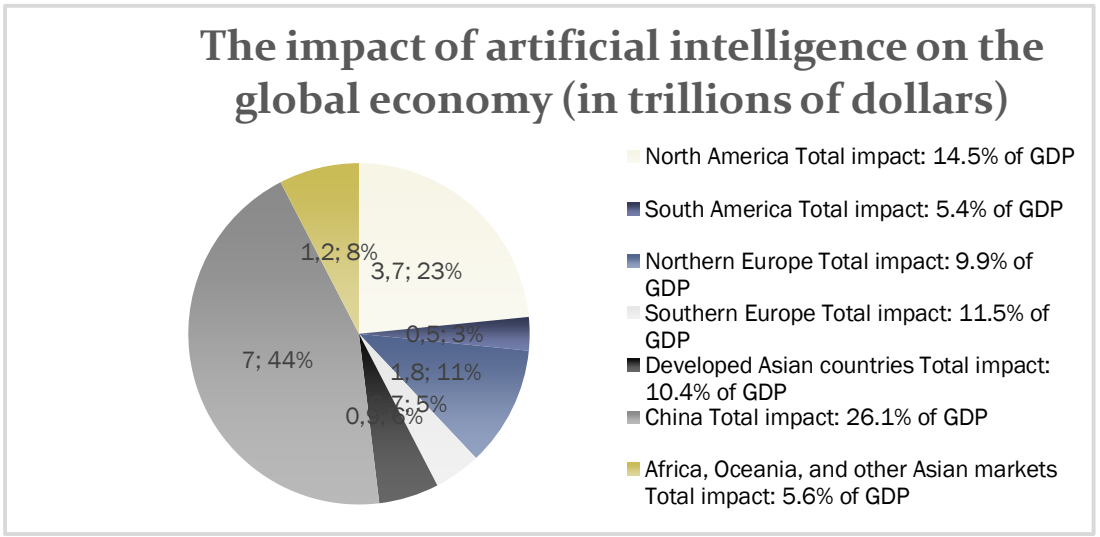

Figure 2. The impact of artificial intelligence on the countries of the world *Source:* *PwC Analysis*

All GDP figures are presented at market rates.

All GDP indicators are reported at real prices, based on the market exchange rate of AI-based indicators.

Technological innovation, coupled with the right management approach, will drive more inclusive and efficient trade growth in the coming years. U.S. exports to Spanish-speaking Latin American countries have skyrocketed on the platform after eBay implemented a new AI-powered translation program. Advances in machine learning have significantly improved the performance of various artificial intelligence (AI) systems.

Suggestions

1. SI should also be implemented by banks as part of their middle office functions to assess risks, detect and prevent payment fraud, improve anti-money laundering (AML) processes, and implement Know Your Customer (KYC) controls.

2. When trade finance providers need to assess the risk of financing a transaction, SI models can be a very effective tool for analyzing data and uncovering the risks associated with small companies.

3. Using the experience of foreign countries (China, Korea, Singapore, and Russia) in the application of artificial intelligence technology in the organization of international trade.

4. Organization of the national e-commerce site in Uzbekistan and implementation of its wide-scale use throughout the world.

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