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Assessment of the Impact of the Logistics Sector in the National Economy in ARDL Model

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ABSTRACT

The development of the tendency to connect all activities of logistics and supply chain functions in the national economy is an urgent issue. In this article, the role and significance of the logistics system in the national economy is studied. In our research, ARDL cointegration relationships and Gauss Markov methods were used in the development of econometric models.

Also, the main conditions of the cointegration relationship in the field of logistics and GDP were examined. In multifactor time series, indicators of cointegration time series were logarithmized, time series were checked for stationarity, regression model was built and residual was checked for stationarity.

Including the financing of the reconstruction of highways and railways by the state, the provision of preferential loans for the construction of terminals, the organization of logistics warehouses equipped with low energy consumption, international priority tasks, such as the establishment of transport corridors, are required for the delivery of goods to ports.

INTRODUCTION.

The impact of logistics services on the economy is becoming increasingly important. The development of the country's economy leads to the development of the logistics system. On the other hand, as logistics develops, it serves as a basis for the development of other sectors of the economy [1].

Today, logistics is even more important as a foundation for economic sectors, as it helps connect the flow of services and goods from first partners to final customers. This explains why logistics is integral to all businesses and economies. We can see that many countries are benefiting from logistics activities. Businesses tend to link all activities of logistics or supply chain functions.

The logistics sector is the backbone of the national economy and is considered the driving force of all branches of agriculture, production or service. Also, the logistics sector is the main element of the international economy, and its importance is related to the growth of the volume of exchanged cargo, as well as the diversity of origins and destinations.

In recent years, the emergence of international production networks has become a key feature of the global economy with the gradual removal of trade barriers [2]. Currently, one of the most important issues in the attention of the leaders of the food industry, horticulture, leather industry, textile industry, cotton and other manufacturing enterprises in the export practice of the country's national economy is logistics services.

The development of the logistics service provides important conditions for the operation of enterprises along with other infrastructure sectors for the country, and serves as an important element in achieving the goals of socio-economic and foreign policy.

The stable and effective operation of the general transport logistics network is a necessary condition for ensuring the country's single economic space, for the further development of various industrial and agricultural sectors in its territory, and for improving the living standards and conditions of the country's population. Also, the presence of excess links in the logistics system has a negative effect on the cost of manufactured products, which is mainly caused by the fragmentation of the logistics chain.

The logistics system accelerates the growth of economic productivity and reduces poverty. There is now considerable evidence that trade liberalization is associated with faster productivity growth in developing countries. It is assumed that the expansion of trade through broad liberalization can under certain conditions promote economic and social development by increasing production and reducing poverty. In this case, the logistics sector should play a decisive role in this process[3].

Literature Review.

Theoretical and practical aspects of the role and importance of the logistics sector in the economic system, the factors affecting it, the analysis of their econometric models, and the introduction of forecasting have been researched by a number of economists.

Also, a lot of theoretical scientific works on the influence of the logistics sector in the economy have been made and definitions have been given.

In particular, the economist B. Erkan defined that "Logistics is one of the main items of costs for enterprises that affect and affect other economic activities." [4]

D.M.Lambert and J.R Stock noted that, logistics can be the best source of competitive advantage for an enterprise, because it is more difficult to repeat than other elements of the marketing mix. In the logistics system, it is the establishment of close and continuous relationships with carriers or logistics service providers, which helps to give the enterprise a clear competitive advantage in terms of speed, reliability, availability or other factors of customer service [5].

European economist K. Martin in his scientific work noted that "Logistics services in the economic system are focused on global supply chains, including large-scale activities related to the physical movement and storage of raw materials and products throughout the supply chain." [6].

The Russian economist N.P. Karpova in her scientific works noted that "in the field of economics, the logistics system is described as a combination of scientific and practical activities, the main task of which is to develop optimal systems for managing the movement of goods, information, and finance in the exchange chain[7].

Today, the state and development of logistics activity is of great importance for the Russian scientists Noskov S.V., Toymentseva I.A., in their works "The field of logistics in the economic system, its purpose is to determine and implement the most effective organizational forms, means, and methods of managing material and information flows "is to install" put forward the idea [8].

A number of researches have been carried out on the effect of some factors on the country's economic growth. In particular, S.Khamdamov in his research calculated some factors share for ensuring economic growth of the Uzbekistan[9].

In the national economy, one of the main tasks is to ensure the responsibility of all types of logistics enterprises in terms of technology and use of the system that provides logistics

elements. In this regard, S. Lin, an Asian economist, commented that "International transport logistics service systems integrate production networks in export import operations and freight forwarding services, perform consolidation and warehousing functions in several countries, and provide value-added deep processing services" [10].

According to European economists Kaplis and E. A. Sheffey, "Logistics is the process of maximizing the movement of goods and purchasing and management of inventory through the enterprise and supply chain" [11].

The development of the logistics sector in economic processes is, first of all, a developed system of transport logistics, warehouse logistics and production logistics, their effective operation is an important condition and factor for reducing the total costs of production.

According to Chinese scientists K.N.Lai and E.V.Ngai, "Logistics is an intermediary that facilitates the physical flow of goods from the place of origin, that is, from the shipper, to the destination, that is, the receiver, in the supply chain. Transport logistics enterprises perform the physical distribution function of moving goods from one place to another, and the business process transcends organizational boundaries to include shippers and receivers [12].

Research methodology.

Scientific abstraction, grouping, comparison, retrospective and prospective, empirical analysis and other methods were used in the research. The importance and necessity of the logistics sector in the development of our country's economy was justified in the article using the method of scientific abstraction.

Also, the econometric analysis of export and import practices in the national economy was considered, forecasted and evaluated with statistical mathematical methods.

Analysis and results.

Analyzing the GDP and logistics services in the national economy during the years 2001-2021, we developed econometric models and equations using multifactor time series to create econometric equations. In the analysis, we analyzed VAR and VEK indicators in multifactor time series. According to the hypothesis, there is a dependence of the logistics sector on the Gross Domestic Product (GDP) in the national economy.

This concept is defined in econometrics by lag, i.e. by calculating the changes of the previous step. Dependence represents the need to apply the VAR model. VAR is a vector auto regression model that includes lags of the outcome variable. Also, the main 4 conditions of the integration of logistics and GDP were examined. The following conditions of cointegrating time series in multivariate time series were tested.

A. Indicators were logarithmized.

B. Time series were checked for stationarity.

C. A regression model was built.

D. It was checked for residual stationary.

Developed a multivariate time series econometric model in the study. According to these econometric equations, the resulting indicators are the GDP of the country for the years 2000-2021. The information in the analysis was prepared based on the information published on the website of the State Statistics Committee of the Republic of Uzbekistan.

Also, in the development of these models, graphic tables, determining the direction and density of the indicators, determining the correlation coefficients, creating regression models, due to the non-cointegration of the model residuals, an equation was created using the ARDL model, and we checked the most important conditions of Gauss Markov in evaluating this econometric

model. The ARIMA model was used to forecast this optimal multivariate time series model, and SIGMA, Log Likehood, AKaiki, and Bayesian tests were tested with two key conditions checked.

When analyzing the indicators of the logistics sector and GDP in the national economy for 2000-2021, the correlation was 68.21 From this result, we can see that the GDP and the logistics sector are strongly connected.

Under the first condition, we can see that GDP and the logistics sector are nonstationary, and we begin by checking the Dickey-Fuller test for any time series analysis in the model [13].

The following Table 1 gives a summary of all heading tests.

Table 1. Dickey-Fuller indicator of national economy GDP.

	Test Statistic	**1% Critical Value**	**5% Critical Value**	**10% Critical Value**	**p-value for Z(t)**
GDP	-2.918	-3.750	-3.000	-2.630	0.0433

When we perform the Dickey-Fuller test on the size of the country's GDP, this test shows that the above time series becomes stationary after first-order differentiation. That is, the p value is greater than 0.005 (0.8441), the value of the test statistic (-0.710) and the remaining values (-3.750, -3.000, -2.630) are greater than all critical values as a negative number, indicating the presence of stationarity. Also MacKinnon The value of Z(t)=0.0433 was a small value, indicating the presence of non-stationarity.

The following Table 12 gives a Dickey-Fuller test score on logistics practice.

Table 2. Dickey-Fuller test score on logistics practice.

	Test Statistic	**1% Critical Value**	**5% Critical Value**	**10% Critical Value**	**P value for Z(t)**
GDP	-4.975	-3.750	-3.000	-2.630	0.0000

When we check the Dickey-Fuller on the import practice, the statistical test value of Z(t) test has a negative number of "-4.975", the critical value of 1 percent is "-3.750", the critical value of 5 percent is "-3.000" and the critical value of 10 percent is "-2.630". representing numbers, forming a small value as a negative number represents the presence of strong stationarity. Also, MacKinnon's value of Z(t)=0.0000 was a small value, indicating the presence of strong stationarity. From these tables 1 and 2, we can see that the indicators selected in this case are non-stationary, and even after being integrated once, both of the factor values did not become stationary indicators at the same time, and the cointegration dependence we can see that the condition is not met.

Due to the fact that the third and fourth conditions of the cointegrating dependence of the model were not fulfilled, we did not determine the Johansen test, Grangercausality test, and did not develop the Vector error correction model in the study on the cointegration time series, and we continued the study by checking the Gauss Markov conditions by constructing the ARDL model. was developed, the model equation was formulated and it was expressed as follows

$$\Delta Lny_t = \delta Lny_{t-1} + \lambda Ln\, x + \delta Lnx_{t-1} + u_t \quad \textbf{(1)}$$

Here:

- Logarithmic value of GDP
- Logarithmized GDP volume of a year ago
- Logarithmic value of the size of the logistics sector
- Logarithmized size of the logistics industry a year ago
- value of errors between years

In the study, we generated a model view using Stata software using the ARDL model. (see Table 13).

Table 3. Indicators of the ARDL model regression equation of the volume of GDP (YAIM) and the volume of the logistics sector (LogTashuv).

YAIM	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L	1.136	.061	1.62	0	1.007	1.265	***
LogTashuv	6.487	0.746	0.012	.007	-88.371	101.345	
L	5.283	0.868	0.14	.018	-51.953	142.519	
Constant	-35.727	38.113	-0.94	.364	-116707.71	45266.255	

Mean dependent var	15.256	SD dependent var	53.340
R-squared	0.694	Number of obs	20
F-test	67.633	Prob > F	0.000
Akaike crit. (AIC)	112.310	Bayesian crit. (BIC)	112.293

**** p<.01, ** p<.05, * p<.1*

As can be seen from Table 3 above, the factor symbols in the model are 1,13 5,14 and 6,48, respectively, while the standard errors are 0.06, 0,74 and 0.86. We can see that the quality of the model given the value of Adjusted R^2=0.69, the actual value of the ANNOVA table is F=15.26 and has a high value.

We can also see that the F and t tests in the regression equation are statistically significant. Also, the value of the ARDL model, which was carried out through the Stata program of the research, was as follows.

$$YAIM=1.13YAIM_{t-1} + 5.14LogTashuv_{t-1} +6.48\ LogTashuv-35.42 \quad (2)$$

Also, when we checked the model with Gaussian Markov conditions, the following occurred. We can see that the Gaussian Markov first condition number of observations is six times the number of signs and we have twenty two observations and two signs and the model is satisfied by the first condition. According to the second condition of Gauss Markov, we can see that the empirical model is equal to the sum of the theoretical data, and it is expressed as follows on the table 4.

According to the fourth condition, the Breusch Pagantest is a test for heteroscedasticity of the regression errors. Heteroscedasticity means "differently distributed," as opposed to homoscedasticity, which means "uniformly distributed." Homoscedasticity in a regression equation is an important assumption, if the assumption is violated we cannot use regression analysis [14].

In our study, the test of Breusch Pagan test was 2.36, and we can see that the condition 4 is also fulfilled, considering that the value for this condition is greater than r>0.05. Also, the Durbin Watson test statistic represents the associated autocorrelation. After we run the regression, the error term should not have zero correlation on average. [16]

In the study, the value of the Durbin Watson test was 1.03, and considering that this value is greater than r>0.05, we can see that this condition is fulfilled.

According to the fifth condition, the Shapiro Willke test is a statistical test used to test whether a continuous variable follows a normal distribution. The null hypothesis (H 0) states that the variable is normally distributed, and the alternative hypothesis (H 1) is that the variable is not normally distributed [15].

So, after performing this test: If $p \leq 0.05$: then the null hypothesis can be rejected (ie the variable is not normally distributed). If $p > 0.05$: the null hypothesis cannot be rejected (ie the variable is normally distributed). The Shapiro Willke value was 0.13, and considering that this value is greater than $r>0.05$, we can see that this condition is satisfied, and we have checked the five conditions of Gauss Markov.

From the above tests, we can see that the model has successfully passed the Gaussian Markov conditions.

Conclusions

1. The following proposals and recommendations were developed as a result of the analysis and conclusions made on the study of the increase in the volume of GDP and logistics industry practices in the national economy and its impact on macroeconomic indicators.
2. in our study, we formulated the model equation and it was expressed as follows:
3. According to the ARDL model ***(GDP=1.13YAIM$_{t-1}$ + 5.14LogTashuv$_{t-1}$+6.48 LogTashuv-35.42***) a one percent change in the volume of GDP in the national economy will lead to an increase in the volume of GDP by 1.13% after one year, and a one percent increase in the volume of the logistics sector will increase the volume of GDP by 5.14 leads to an increase of 14 percent. We can also see that a one percent increase in the volume of the logistics sector will lead to a 6.48 percent increase in the volume of GDP one year later.
4. From this we can conclude that the role of logistics services in increasing the level of GDP in the conditions of market relations is of particular importance. In particular, the increase in the share of logistics services in the total price of goods and services of manufacturing and service enterprises indicates that there is enough work to be done in this regard.
5. At the same time, in order to increase the volume of GDP in the national economy today, it is necessary to fully research many issues related to the structural and functional organization of the financing of the logistics system
6. in our country, the improvement of the strategy for the development of products and services produced by enterprises.

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