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	GIF (Australia) = 0.564	ESJI (KZ) = 9.035	IBI (India) = 4.260
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SEM MODEL ANALYSIS OF AIR CARGO SHIPPING EFFICIENCY IN UZBEKISTAN

Abstract: *Cargoes from Logistics are insured on preferential terms, customs always go through quickly, and the package of papers meets the latest requirements. Reliable fixation of the load in the compartment is dictated by practical considerations. In this article author study current status of the cargo shipment of airways network of Uzbekistan. Main purpose was found out correlation and regression analyses by using causality of selected variables during pandemic period. Results obtained by using Stata 16.0. Out of four variables three were statistically significant by using SEM model. As a conclusion due to restrictions majority sectors, we delayed or completely stopped shipping service.*

Key words: *Cargo, shipment, economic effectiveness, SEM model, cost, airlines.*
Language: *English*
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Scopus ASCC: *2000.*

Introduction

The world air cargo market is developing every year, which is explained by the growing number of goods transported. Air transportation remains in demand for numerous reasons: corporate clients receive a guarantee of high-speed delivery, unlimited geography of transportation and minimal risks of theft. The company's clients regularly choose air cargo transportation in Uzbekistan and other international routes. Well organized companies' delivery of goods in accordance with the specified terms and requirements. Due to many years of cooperation with international airlines and agents, a flexible pricing policy and world-class service have been prepared for the company's Clients.

Today, cargo planes deliver every type of product. However, there are products that require special handling. A team of specialists monitors changes in the legal regulation of air transportation both in Uzbekistan and in world traffic. This guarantees the Clients of the transport and logistics provider a safe and prompt delivery, regardless of the characteristics of the cargo. When transporting dangerous goods, there is a risk of damage to the aircraft or related goods. Majority employees are thoroughly familiar with the norms of such transportation and notify Clients in advance about the specifics of the transportation of goods requiring special handling.

Organization of air transportation from and to Uzbekistan. Air transportation of goods "Tashkent-Europe". International air transportation of goods in Europe (including the Balkans and Scandinavian countries). International air transportation of goods across Uzbekistan and the CIS. Air cargo transportation between Europe and the Caucasus. International air cargo transportation between Europe and Central, Southeast Asia. Air cargo transportation between Europe and China. Air cargo transportation between Europe and the USA [1].

Methods and Materials

Current research held based on quantitative method by using secondary source data from Stat.uz official Statistical Comity of the Republic of Uzbekistan. Data was times series and used various

tests like Pearson Correlation and Spearman Correlation tests, OLS regression and SEM model was distributed.

Main outcomes and results obtained by using STATA 16.0.

Results

To receive a freight rate, please fill out the following form. Please note that goods from 1 pallet and / or over 500 kg are accepted for transportation. To transport goods up to 500 kg, use the services of groupage cargo or air delivery. does not transport personal belongings [2].

According to statistics, the probability of getting into a plane crash is thousands of times less than getting into trouble on the track or while the train is moving. The situation is similar with international cargo transportation. Delivery of goods by air is the safest and fastest method of transportation over long distances [3].

Table 1. Summarize of the variables

```
. sum
```

Variable	Obs	Mean	Std. Dev.	Min	Max
year	21	2010	6.204837	2000	2020
sent_cargo~n	21	15.33333	9.104413	5.3	30.7
cargo_turn~m	21	122.3571	33.53852	76.7	219
totalcargo~m	21	67.18095	7.267024	54.6	83.8
totalsent_~n	21	942.4095	203.0648	707.6	1366.7
totaltrans~s	11	59762.36	101629.8	10524.4	362717.2

Table 1 indicates general four individual data summary.

Table 2. Description of the variables

```
Contains data
  obs:            21
 vars:             6
```

variable name	storage type	display format	value label	variable label
year	int	%8.0g		
sent_cargotho~n	float	%8.0g		Sent_cargothousandtonn
cargo_turnove~m	float	%8.0g		Cargo_turnovermlntonn-km
totalcargo_tu~m	float	%8.0g		Totalcargo_turnoverbln-km
totalsent_car~n	float	%8.0g		Totalsent_cargomlntonn
totaltranspor~s	double	%10.0g		Totaltransport_serviceblnuzs

According to the table 2 it is indicated total description of the given variables. So, sent total cargo, cargo turnover, total cargo turns over, total sent cargo and total transportation goods of the republic of Uzbekistan.

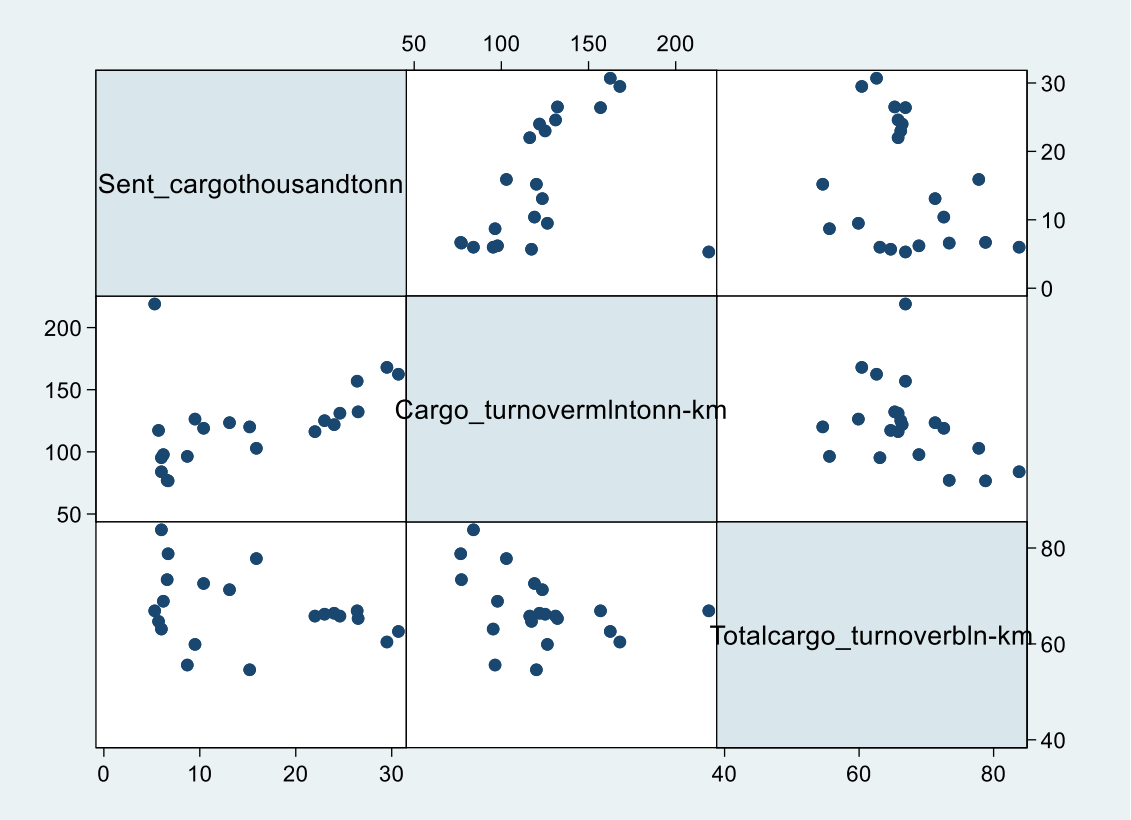

Figure 1. Graph matrix of the independent variables

Figure 1 explains correlation of the selected variables. Majority can be classified that cargo turnover and total sent cargo has a positive relationship.

twoway(scatter cargo_turnovermlntonnkm sent_cargothousandtonn)(lfit cargo_ turnovermlntonnkm sent_cargotho> usandtonn)

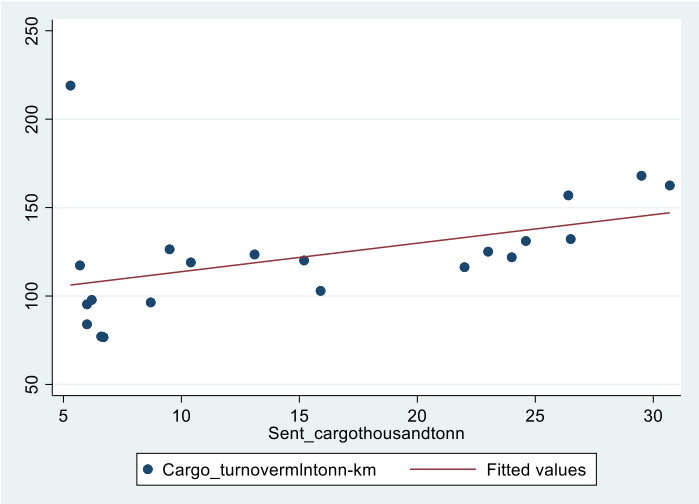

Figure 2. Twoway graph of scatter plot

If we see figure 2 association between sent_cargothousandtonn and cargo_turnovermlntonnkm scatterplot indicates positive relationship regression line. In case of air delivery of cargo by plane, it is additionally possible: assistance in preparing the documents necessary for sending the cargo, forwarding, storage of cargo in warehouses, packaging and further shipment with a guarantee of safety [4].

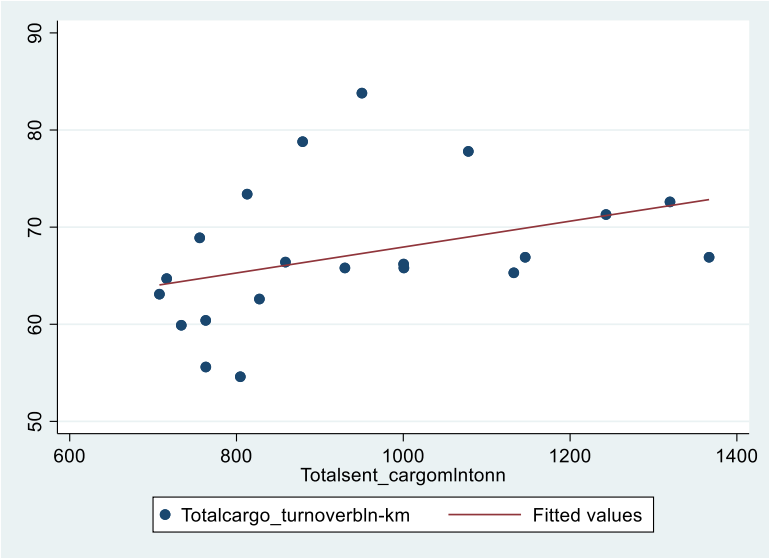

Figure 3. Twoway graph of total cargo turn over (bln/km)

Other case has been recorded total cargo turn over (bln/km) positive causality between variable. Air delivery minimizes any external factors, guaranteeing the safety of the content and the promptness of order fulfillment.

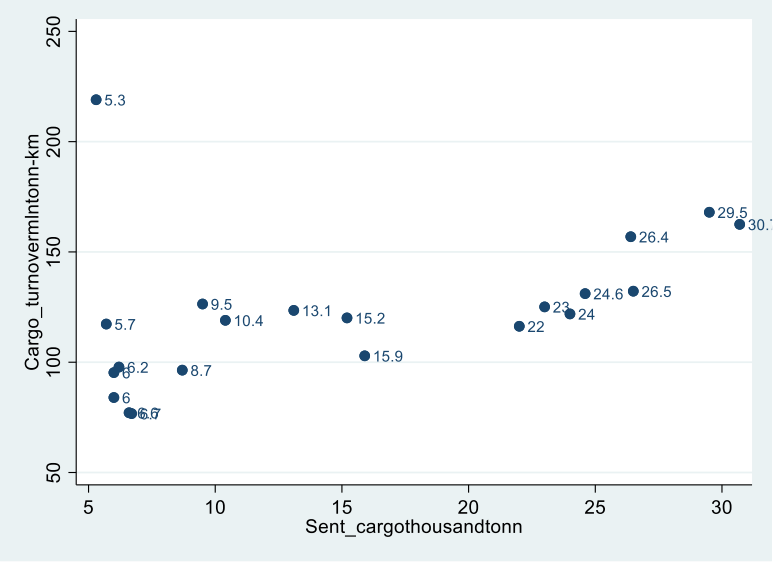

Figure 4. Matrix graph of descriptive statistics

By default, approximately three values are labeled and ticked on the y and x axes. When graphing only a few variables, increasing this often works well. The origin of the scatterplot matrix is unknown, although early written discussions may be found in Hartigan (1975), and Chambers et al. (1983). The scatterplot matrix has also been called the draftman's display and pairwise scatterplot. Regardless of the name used, we believe that the first "canned" implementation was by Becker and Chambers. So, Figure 4 states that sent cargo and cargo turn over spread sheet in graph.

Now we tested Pearson Correlation test which indicates at Table 3.

Table 3. Pearson Correlation test

```
. pwcorr sent_cargothousandtonn cargo_turnovermlntonnkm total
> ltransport_serviceblnuzs,sig
```

	sent_c~n	cargo_~m	totalc~m	totals~n	totalt~s
sent_cargo~n	1.0000				
cargo_turn~m	0.4370 0.0476	1.0000			
totalcargo~m	-0.2996 0.1870	-0.3783 0.0909	1.0000		
totalsent_~n	0.0983 0.6717	0.4330 0.0499	0.3726 0.0962	1.0000	
totaltrans~s	0.0630 0.8541	0.1695 0.6182	0.1717 0.6137	0.2958 0.3772	1.0000

From the table we can see correlation value and it ecoefficiency.

Table 4. Spearman Correlation test

```
. spearman sent_cargothousandtonn cargo_turnovermlntonnkm tota
> ltransport_serviceblnuzs
(obs=11)
```

	sent_c~n	cargo_~m	totalc~m	totals~n	totalt~s
sent_cargo~n	1.0000				
cargo_turn~m	0.4182	1.0000			
totalcargo~m	-0.7945	-0.3744	1.0000		
totalsent_~n	-0.7091	-0.0364	0.7991	1.0000	
totaltrans~s	-0.5364	-0.0545	0.7854	0.9364	1.0000

The next test was Pearson correlation which detail information output, like hood value as described. After this test we used box plot which means graph box cargo_turnovermlntonnkm graph box sent_cargothousandtonn

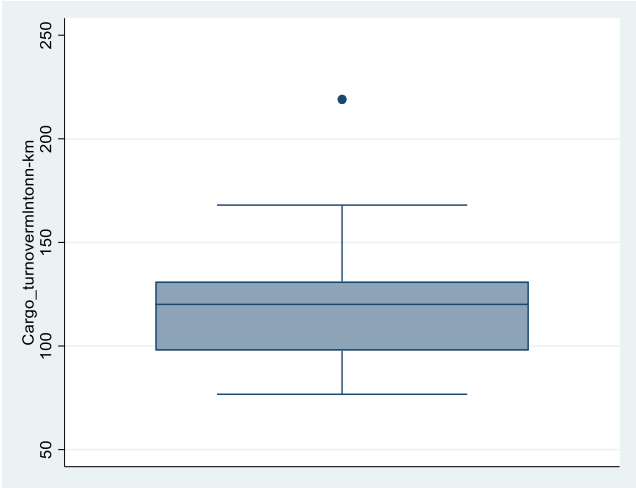

Figure 5. Graph box cargo turnover mln ton/km

75 percent of the given data how well distributed ib the graph 5. E can see from the graph that only one year value is out of the Q1 and Q3.

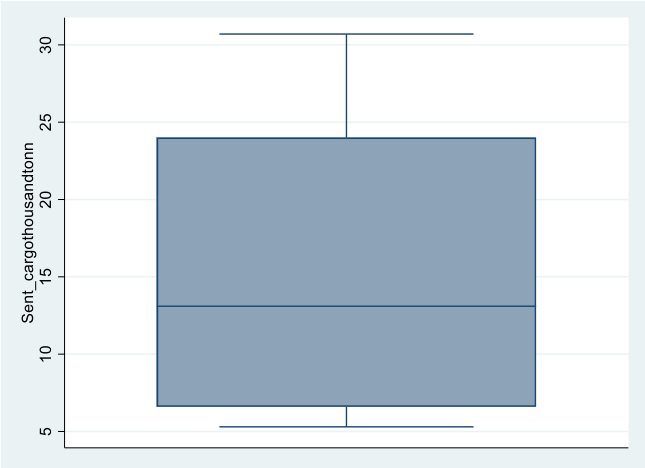

Figure 6. Graph box sent cargo turnover mln ton/km

For about figure 6 indicates other relationship by cargo shipment turnover.

Table 5. SK test cargo turnover mln ton/km

```
. sktest cargo_turnovermlntonnkm

                    Skewness/Kurtosis tests for Normality
                                                              ------ joint ------
    Variable |        Obs  Pr(Skewness)  Pr(Kurtosis) adj chi2(2)    Prob>chi2
-------------+-------------------------------------------------------------------
cargo_turn~m |         21      0.0242        0.0614        7.45          0.0241
```

Histogram cargo_turnovermlntonnkm

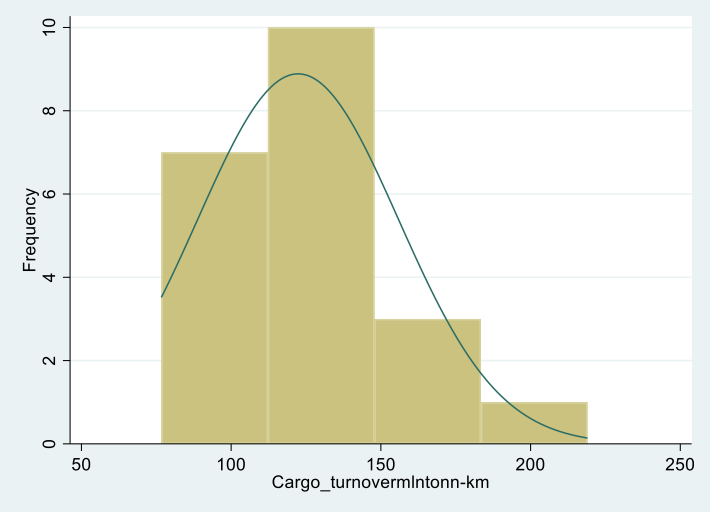

Figure 7. Histogram cargo_turnovermlntonnkm

Histogram as not so good distributed, but it is in significance level.

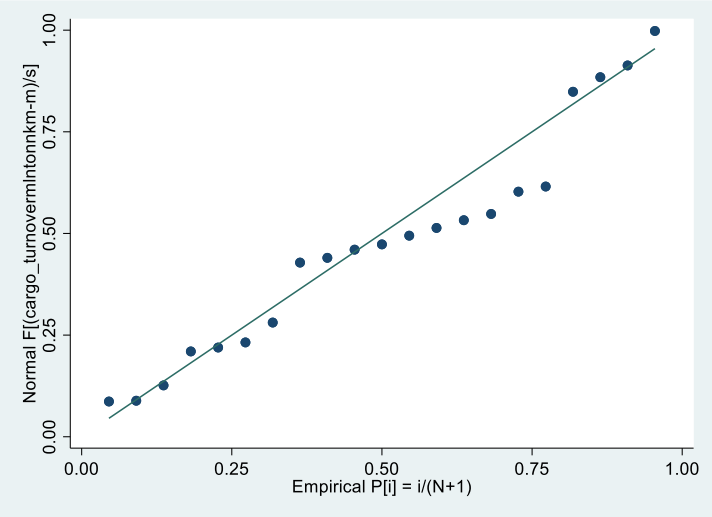

Figure 8. Pnorm cargo_turnovermlntonnk

To ensure high rates of economic growth in the next five years, $ 120 billion will be attracted, of which at least $ 70 billion will be foreign investments. Projects based on public-private partnerships will attract $ 14 billion in investments in the transport sector, road construction and other areas [5].

Table 6. Regression Analysis

```
. reg cargo_turnovermlntonnkm sent_cargothousandtonn totalcargo_turnoverblnkm totalsent_cargomln
> ansport_serviceblnuzs
```

Source	SS	df	MS		
				Number of obs	= 11
				F(4, 6)	= 11.43
Model	8545.83987	4	2136.45997	Prob > F	= 0.0057
Residual	1121.06152	6	186.843587	R-squared	= 0.8840
				Adj R-squared	= 0.8067
Total	9666.9014	10	966.69014	Root MSE	= 13.669

cargo_turnovermlntonnkm	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sent_cargothousandtonn	-3.830986	1.236075	-3.10	0.021	-6.855552	-.8064192
totalcargo_turnoverblnkm	-13.52624	2.120637	-6.38	0.001	-18.71525	-8.337227
totalsent_cargomlntonn	.0584394	.053337	1.10	0.315	-.0720714	.1889503
totaltransport_serviceblnuzs	.0001143	.0000555	2.06	0.085	-.0000215	.0002501
_cons	1054.741	149.164	7.07	0.000	689.7502	1419.732

According to the regression analyses sent cargo and total cargo turnover are negative relationship with cargo turnover in Uzbekistan. In the next five years, the Republic of Uzbekistan plans to increase economic growth by 1.5 times and bring GDP to $ 100 billion, and the volume of industrial production by 1.4 times [6]. The country's export potential will increase 1.7 times and will reach $ 30 billion in 2026. In the export structure, the share of raw materials will decrease twice to 23%, and the volume of finished products will increase 2.5 times.

Table 6. Robust Regression Analysis

```
. reg cargo_turnovermlntonnkm sent_cargothousandtonn totalcargo_turnoverblnkm totalsent_cargomln
> ansport_serviceblnuzs,vce(robust)

Linear regression                               Number of obs     =         11
                                                F(4, 6)           =      80.53
                                                Prob > F          =     0.0000
                                                R-squared         =     0.8840
                                                Root MSE          =     13.669
```

cargo_turnovermlntonnkm	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sent_cargothousandtonn	-3.830986	1.016135	-3.77	0.009	-6.317379	-1.344592
totalcargo_turnoverblnkm	-13.52624	1.000299	-13.52	0.000	-15.97388	-11.07859
totalsent_cargomlntonn	.0584394	.0488262	1.20	0.276	-.0610341	.1779129
totaltransport_serviceblnuzs	.0001143	.000031	3.69	0.010	.0000385	.0001902
_cons	1054.741	65.41017	16.13	0.000	894.6883	1214.794

If we use robust regression analyses, we can obtain new results based on table 6.

Table 7. Regression Models with Logarithmic Transformations

```
. reg logcargo_turnovermlntonnkm sent_cargothousandtonn totalcargo_turnoverblnkm totalsent_carg
> ltransport_serviceblnuzs
```

Source	SS	df	MS		
				Number of obs	= 11
				F(4, 6)	= 9.42
Model	.331632208	4	.082908052	Prob > F	= 0.0093
Residual	.052780764	6	.008796794	R-squared	= 0.8627
				Adj R-squared	= 0.7712
Total	.384412972	10	.038441297	Root MSE	= .09379

logcargo_turnovermlntonnkm	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sent_cargothousandtonn	-.0214889	.0084814	-2.53	0.044	-.0422422	-.0007356
totalcargo_turnoverblnkm	-.0853115	.0145509	-5.86	0.001	-.1209162	-.0497068
totalsent_cargomlntonn	.0004057	.000366	1.11	0.310	-.0004898	.0013012
totaltransport_serviceblnuzs	7.45e-07	3.81e-07	1.96	0.098	-1.87e-07	1.68e-06
_cons	10.59704	1.023498	10.35	0.000	8.092632	13.10145

According to preliminary estimates, the total volume of cargo transportation in the country will grow 1.4 times, and the volume of international cargo transportation (export, import and transit, excluding pipeline transport) will grow 1.6 times. Sustainable development of the economy and foreign trade, as well as an increase in the well-being of the population cannot be ensured without the systematic, advanced development of transport, infrastructure and logistics [7]. But if we use natural logarithm our regression can be changed by following outcomes.

ln cargo_turnovermlntonnkm = 10.59-0.021*sentcargo-0.005*totalcasgoturnover+0.0004*totalsentcargo+7.45e-07*totaltransportservice

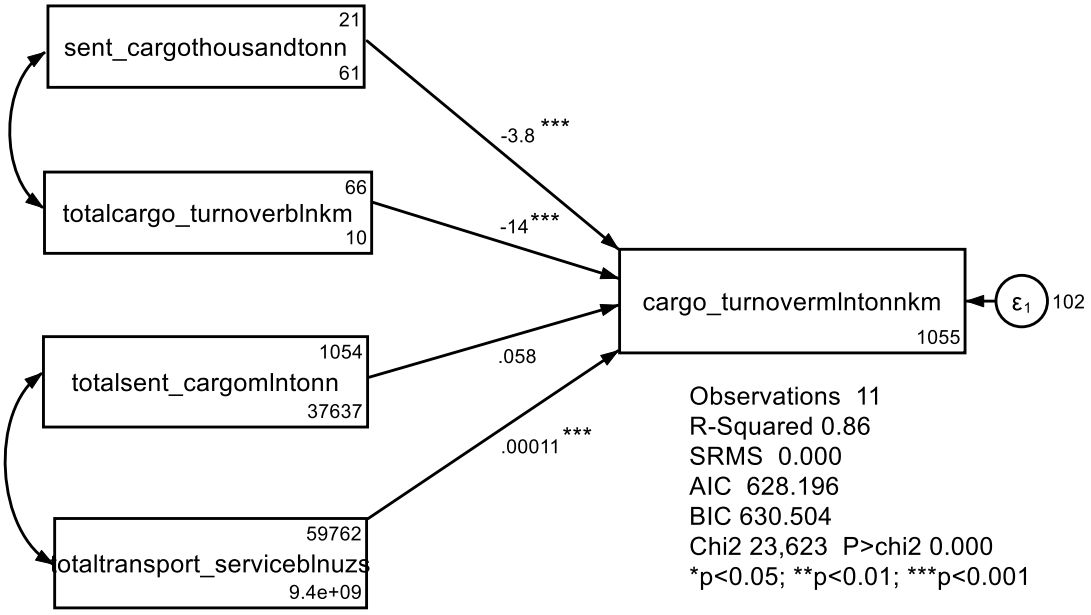

Figure 9. SEM model of the air cargo shipping of Uzbekistan during 21 years

We analyzed on SEM applications in 21 years data. Bayesian SEM, partial least square SEM, hierarchical SEM, and variable/model selection. We identified ten common issues in SEM applications including strength of causal assumption, specification of feedback loops, selection of models and variables, identification of models, methods of estimation, explanation of latent variables, selection of fit indices, report of results, estimation of sample size, and the fit of model. According to the figure three variables are statistically significant in level of P<0,05% (Figure 9).

Discussion

This type of cargo transportation is quite specific. It is not suitable for everyone, because it imposes certain restrictions and requires the involvement of additional transport to deliver cargo to the airfield. To understand the intricacies and determine whether it is advisable to use international air transportation of goods in your case, we will consider their features by

As mentioned above, speed and safety are the main advantages of air transport over land or water transport. There are no alternatives and are not foreseen in the foreseeable future.

Air delivery is often used for cargo with atypical parameters, dangerous goods, medicines, expensive perishable goods. But not every oversized item can be placed inside the aircraft fuselage. It is necessary to make accurate calculations, work on the weight distribution, and make special fasteners.

With standard and groupage cargo, the situation is simpler. There are no problems with them, except for the cost of the operation. Delivery of goods by air is cost-effective when it is necessary to transport them as quickly as possible, for goods that are rapidly losing their properties, humanitarian aid, etc.

Conclusion

Finally Uzbekistan has given priority to the development of international transport corridors, digitalization of the logistics chain, including the processes of passing goods and vehicles through border points, reducing physical and non-physical barriers to the movement of international goods, optimizing transport and other costs in the cost of export products, increasing the speed of delivery of goods, improving the country's indicative indicators in the World Bank's Logistics Performance Index. A number of cardinal decisions were made long before the onset of the COVID 19 pandemic, which made it possible to get out of the cargo shipment with minimal losses.

Acknowledgement

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