AMERICAN Journal of Science on Integration and Human Development
Volume 02, Issue 06, 2024 ISSN (E): 2993-2750

FORECASTING THE VOLUME OF PRODUCT (WORKS, SERVICES) EXPORT OF SMALL BUSINESS SUBJECTS OF THE REPUBLIC OF UZBEKISTAN USING TREND MODELS

Hajikulova is the daughter of Feruza Dona
Teacher of the Department of Economics of Termiz State University.

Kenjayeva Sabohat Safarovna
2nd year student of the "Economics" department of Termiz State University.

Annotation We know that a number of measures have been implemented in our country to find a solution to the problem of increasing the volume of exports, in theory, its economic analysis is considered a very important factor for our national economy. Because, to find a solution to the problem of increasing the volume of exports at the present time, increasing the volume of products(work, services)that are emerging on the basis of the exact demand and supply of our current era, as well as increasing the volume of sales in our country, represent the future state of this market and our overall economy. This article will talk about the Arima model of forecasting and analyze the number of unemployment using this model.
Keywords: small business entities, export, export volume, Arima model.
Annotatsiya Bilamizki, mamlakatimizda eksport hajmini oshirish muammosiga yechim topish uchun qator chora-tadbirlar amalga oshirilib kelmoqda, nazariy jihatdan uni iqtisodiy tahlil qilish milliy iqtisodiyotimiz uchun juda muhim omil sanaladi. Chunki, hozirgi vaqtda eksport hajmini oshirish muammosiga yechim topish qator davlatlarning shuningdek mamlakatimizda salmog'ini oshirish hozirgi zamon davrimizning aynan talab va taklifi asosida paydo bo'layotgan mahsulot(ish, xizmat)lar hajmini ko'paytirish ushbu bozorning va umumiy iqtisodiyotimizning kelajak holatini ifodalaydi. Ushbu maqolada prognozlashning Arima modeli haqida so'z borib, ushbu model yordamida ishsizlik soni tahlil qilingan.
Kalit so'zlar: Kichik tadbirkorlik subyektlari, eksport, eksport hajmi, Arima modeli.

As for the trend models, a trend means a stable, systematic change in a process over a long period of time. In this regard, the economic-mathematical dynamic model, which reflects the development of the modeled socio-economic system through the trend of its main indicators, is called a trend model. The purpose of trend modeling is to model the smooth large-scale deterministic component of a regional variable. Trend models are built using available data, which leads to a degree of subjectivity. Trend features look different at different scales.

In general, there are the following types of trend models:

- y=a*e^bx-exponential trend model;
- y=a+b*t-linear trend model;
-y=a+b*lnt-logarithmic trend model;
-y=a+b_1*t+b_2*t^2-2nd degree polynomial;
-y=a*t^b-level trend model.

Using these trend models, we forecast the number of unemployed people in the labor market of the republic. We used Microsoft Excel for this. The data from the official website of the Statistics Department of Surkhondarya region www.surkhonstat.uz were used for the analysis (Table 1).

Table 1
The volume of export of products (works, services) of small business entities of the Republic (billion soums)

Years	Number of the unemployed	Years	Number of the unemployed
2010	1782,8	2017	2759,3
2011	2826,2	2018	3810,8
2012	1910,5	2019	4714,8
2013	3752,3	2020	3100,9
2014	3657,8	2021	3335,2
2015	3377,7	2022	5712,9
2016	3139,2	2023	7092,1

We downloaded the data for the experiment to MS Excel. Having specified the data range, we selected the "Insert-diagramma-Tochechnaya" diagram. As a result, we got the following, and in modeling the number of unemployed in our Republic, we first check the stationarity of the time series. To do this, let's look at the time series chart (Figure 1).

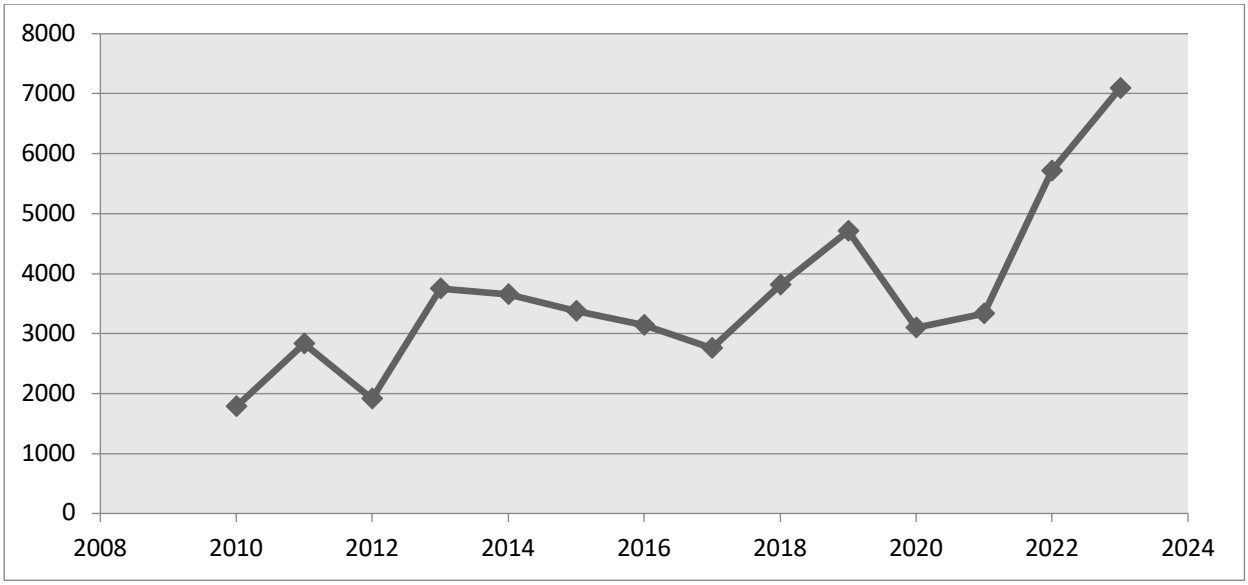


Figure 1. The volume of export of products (works, services) of small business entities of the Republic

From Figure 1, we can see that the time series mean is not constant. Therefore, we check the stationarity of its first differences. For this, we use the extended Dickey-Fuller test (Table 2).

Table 2
Augmented Dickey-Fuller test results

```
Augmented Dickey-Fuller test for d_y
testing down from 4 lags, criterion AIC
sample size 11
unit-root null hypothesis: a = 1

  test without constant
  including one lag of (1-L)d_y
  model: (1-L)y = (a-1)*y(-1) + ... + e
  estimated value of (a - 1): -1.43234
  test statistic: tau_nc(1) = -2.38485
  asymptotic p-value 0.01652
  1st-order autocorrelation coeff. for e: 0.109

  test with constant
  including one lag of (1-L)d_y
  model: (1-L)y = b0 + (a-1)*y(-1) + ... + e
  estimated value of (a - 1): -1.71979
  test statistic: tau_c(1) = -2.95929
  asymptotic p-value 0.03888
  1st-order autocorrelation coeff. for e: 0.023
```

According to Table 2, the p-value is 0.01652 and the p-value is 0.03888 according to the results of the univariate test. These values are less than the desired significance levels, i.e. $\alpha=0.1,\alpha=0.05,\alpha=0.01$. So the first differences of the time series are stationary. This means that the order d of the ARIMA(p,d,q) model is equal to 1. For now, our model looks like this:
ARIMA(p,1,q) (3.3.3.)

In the next step, we determine the order p and q. To do this, we will look at the ACF AND PACF correlograms.

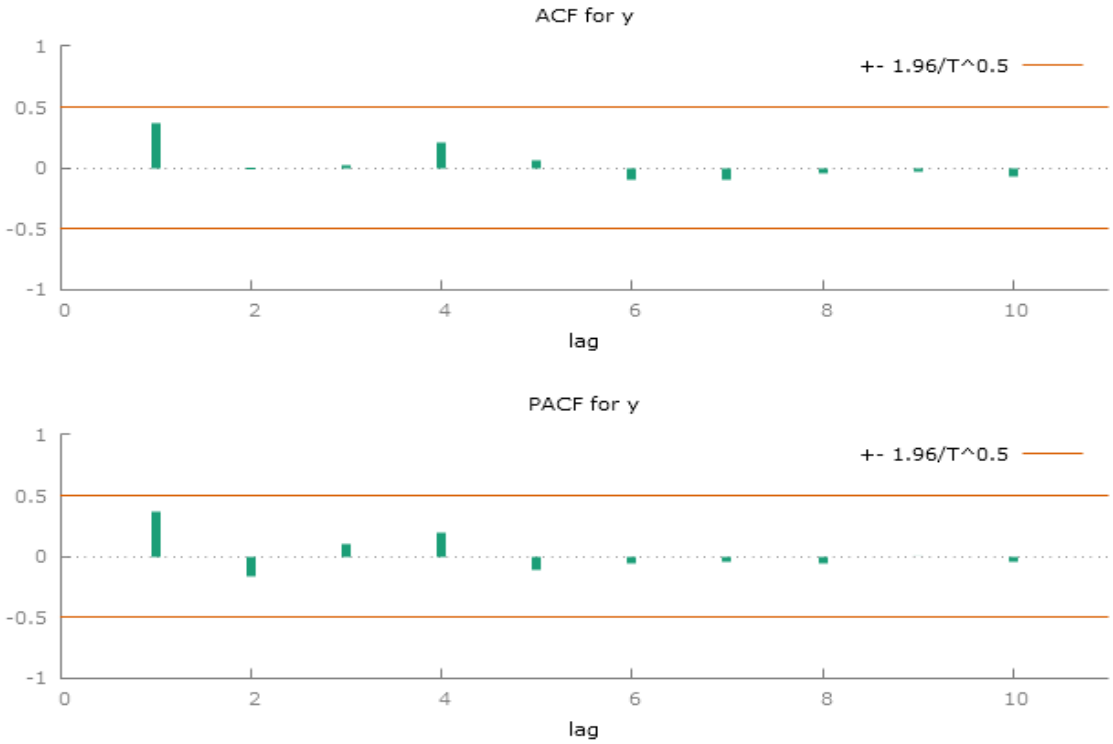


Figure 2. Time series correlogram

According to Figure 2, it is impossible to determine any order of p and q. Therefore, we use the capabilities of the Gretl program. Let's experiment with ARIMA(3,1,3) model order from ``ARIMA lag selection'' in Gretl (Table 6).

Table 6

ARIMA lag selection results

Estimated using AS 197 (exact ML)
Dependent variable d_y, T = 13
Criteria for ARMA(p, q) specifications

p, q	AIC	BIC	HQC	loglik
0, 0	222.8457*	223.9756*	222.6134*	-109.4228
0, 1	223.4240	225.1189	223.0757	-108.7120
0, 2	223.1359	225.3957	222.6714	-107.5679
0, 3	225.0188	227.8436	224.4382	-107.5094
1, 0	224.7335	226.4283	224.3851	-109.3667
1, 1	224.2941	226.5539	223.8296	-108.1470
1, 2	225.0883	227.9131	224.5077	-107.5442
1, 3	226.3174	229.7071	225.6206	-107.1587
2, 0	224.2151	226.4749	223.7506	-108.1076
2, 1	224.1439	226.9686	223.5633	-107.0719
2, 2	226.1437	229.5334	225.4470	-107.0719
2, 3	227.4914	231.4460	226.6785	-106.7457

3, 0	224.9720	227.7968	224.3914	-107.4860
3, 1	226.9266	230.3163	226.2299	-107.4633
3, 2	227.8444	231.7990	227.0315	-106.9222
3, 3	229.5583	234.0779	228.6293	-106.7791

'*' indicates best, per criterion
Log-likelihood ('loglik') is provided for reference

According to Table 3, the order p=0 and q=0 is significant according to the Akank criterion. Therefore, we experiment with the ARIMA(3,1,1) model order (Table 4).

Table 4

Regression analysis results

Model 4: ARIMA, using observations 2011-2023 (T = 13)
Dependent variable: (1-L) y
Standard errors based on Hessian

	Coefficient	*Std. Error*	*z*	*p-value*	
const	327.449	161.871	2.023	0.0431	**
phi_1	0.370312	0.548629	0.6750	0.4997	
phi_2	−0.856582	0.160991	−5.321	<0.0001	***
phi_3	0.0321322	0.495522	0.06485	0.9483	
theta_1	−0.978538	0.390486	−2.506	0.0122	**
theta_2	1.00000	0.441318	2.266	0.0235	**

Mean dependent var	408.4077		S.D. dependent var	1139.362
Mean of innovations	8.071857		S.D. of innovations	757.3625
R-squared	0.677313		Adjusted R-squared	0.515969
Log-likelihood	−106.9222		Akaike criterion	227.8444
Schwarz criterion	231.7990		Hannan-Quinn	227.0315

		Real	*Imaginary*	*Modulus*	*Frequency*
AR					
	Root 1	0.1968	-1.0706	1.0885	-0.2211
	Root 2	0.1968	1.0706	1.0885	0.2211
	Root 3	26.2644	0.0000	26.2644	0.0000
MA					
	Root 1	0.4893	-0.8721	1.0000	-0.1686
	Root 2	0.4893	0.8721	1.0000	0.1686

According to Table 4, the coefficients of φ_2 and theta1 and theta2 are statistically significant. According to Table 4, all parameters of the model are statistically significant.

Also, the approximation error of the model is MARE=18.893%. In addition, it was found that there is no autocorrelation in the residuals. Also, the residuals of the model obey the normal distribution

law.

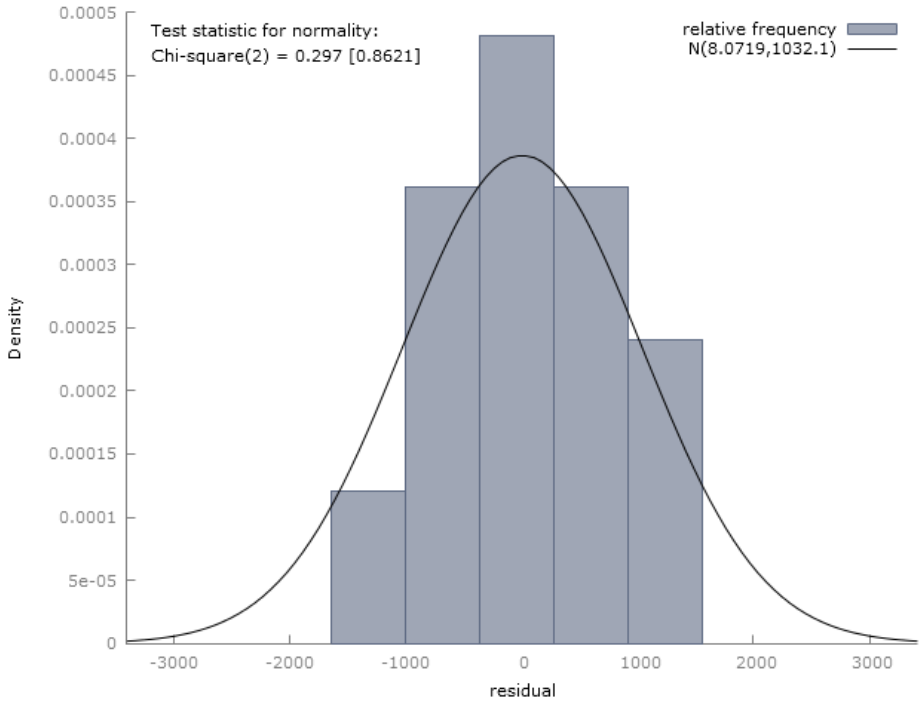
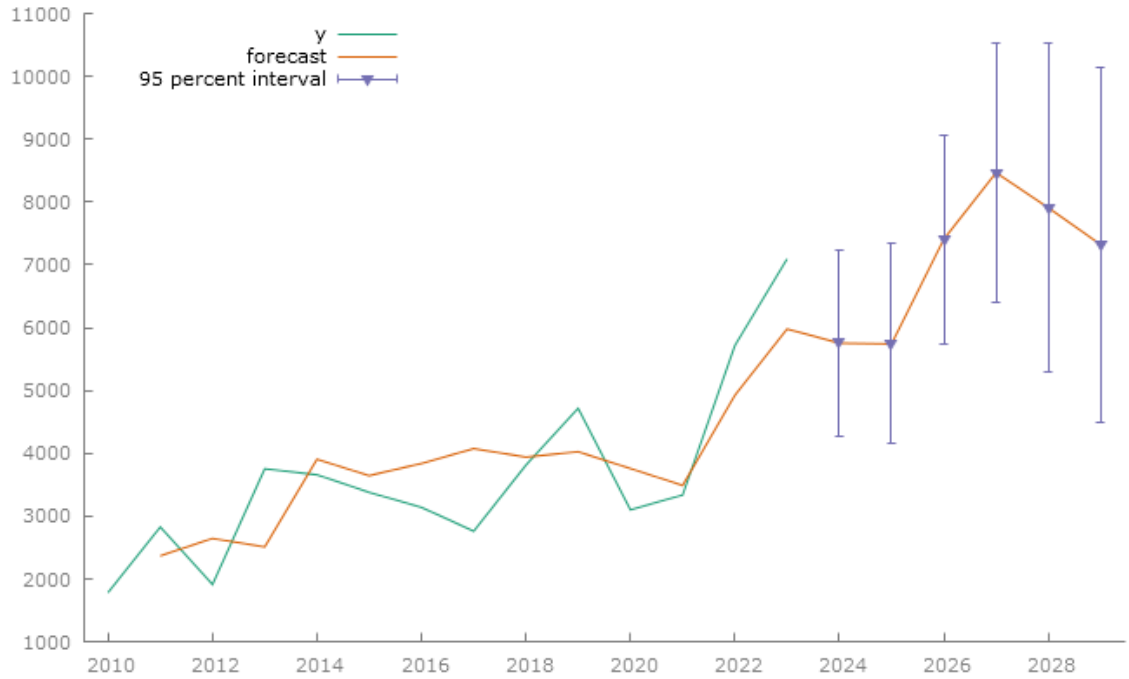


Figure 3. Normality of residuals



We can forecast using the model.

Table 5

Forecast and confidence intervals

Years	Pointer actual values	Theoretical values of the indicator	Standard error	Lower bound of the 95% confidence	Upper bound of the 95% confidence

				interval	interval
2010	1782.80				
2011	2826.20	2366.32			
2012	1910.50	2644.21			
2013	3752.30	2508.59			
2014	3657.80	3905.56			
2015	3377.70	3643.23			
2016	3139.20	3836.77			
2017	2759.30	4073.39			
2018	3810.80	3939.57			
2019	4714.80	4024.48			
2020	3100.90	3756.22			
2021	3335.20	3487.80			
2022	5712.90	4920.77			
2023	7092.10	5977.88			
2024		5751.65	757.362	4267.24,	7236.05
2025		5740.64	813.411	4146.39,	7334.90
2026		7405.25	846.609	5745.92,	9064.57
2027		8464.18	1055.73	6395.00,	10533.4
2028		7906.25	1334.10	5291.47,	10521.0
2029		7322.22	1440.34	4499.20,	10145.2

Summary. With the increase in the volume of export of products (work, services) of small business entities of the Republic, the country's gross domestic product will not only increase in the volume of the country's gross domestic product per capita, and this data for 2010-2023 was given, and the volume of annual product export collected using statistical observations was observed to be stationary. Using the Dickey-Fuller test, it was determined that stationarity exists when the first-order integrator is I(1). We calculated that the most optimal model for the ARIMA model is ARIMA(3, 1, 1). The ARIMA(3, 1, 1) model determined the value indicators of the volume of product (work, service) export of small business entities in our republic until 2029. In 2024, the volume of export of products (work, services) of small business entities in our republic amounted to 5751.65 billion soums, and by 2029 this indicator will reach 7322.22 billion soums. During the last 5 years, the volume of export of products (work, services) of small business entities in our republic will increase by 1570.57 billion soums according to the forecast results. The highest growth in terms of years will occur in 2027, the volume of export of products (work, services) of small business entities in our republic will be from 5751.65 billion soums to 8464. billion soums. Descriptive statistics conducted between the volume of product (work, service) export of small business entities in our republic and the forecast of the volume of product (work, service) export of small business entities in our republic, calculated using the ARIMA model, showed positive results. It will be possible to achieve forecast indicators as a result of forming the basis of the volume of product (work, service) exports of small business entities in our republic, their correct formation and determining the factors affecting these processes.

As a suggestion, we can mention the following information. In order to increase the volume of export of products (works, services) of small business entities, it is possible to implement the following ways of entering foreign or international markets:

Entering Emerging Markets: Entering new and emerging markets provides good opportunities to increase your export volume. Here, you can offer quality products or services to enter new countries or international markets at a reasonable price.

Offering products of international standards: Produce products of international quality and standards. This creates many opportunities for customers as it gives them the opportunity to provide quality and reliable products.

Marketing and Branding: It is very important to present your products well and create critical branding for them. Use marketing and branding strategies to introduce yourself in new markets and attract the attention of customers.

Establishing international trade relations: Entering or becoming a member of an international trade relations structure will help you to find new customers. In addition, you can identify new markets and export opportunities through international trade relations.

Product appropriation and leasing: Some countries want to appropriate it for their foreign trade. Also, leasing products with other entrepreneurs can help you increase your export volume.

Cooperation with international financial organizations: Cooperation with international financial organizations or financial institutions, for example, obtaining finance or financing, establishing a safe platform for new investments, helps in increasing the volume of exports.

International Trade Area Study: International trade area study is very important in analyzing the current market and identifying new opportunities. This will help in the development of export promotion strategies.

These suggestions are general strategies for increasing the export volume of small business entities. It can and should be optimal for each subject.

. References.

1. Information from the official website of the Statistics Department of Surkhondarya region www.surkhonstat.uz

2. Hozhiqulova F. IMPACT OF THE DEVELOPMENT OF FINANCIAL TECHNOLOGIES ON THE TRANSFORMATION CAPACITY OF BANKS //Prioritetnye napravleniya, sovremennye tendentsii i perspektivy razvitiya finansovogo rynka. - 2023. - S. 317-318.

3. Hojiqulova F. FUNDAMENTALS OF LOCAL BUDGET INCOME FORMATION //Interpretation and research. - 2023. - T. 1. – no. 13.

4. Hozhiqulova F. IMPACT OF THE DEVELOPMENT OF FINANCIAL TECHNOLOGIES ON THE TRANSFORMATION CAPACITY OF BANKS //Prioritetnye napravleniya, sovremennye tendentsii i perspektivy razvitiya finansovogo rynka. - 2023. - S. 317-318.