SURXONDARYO VILOYATI SANOATINI PROGNOZ QILISHDA ARIMA MODELLARIDAN FOYDALANISH

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ANNOTATSIYA

Ushbu maqolada ARIMA modellari orqali Surxondaryo viloyati sanoatini 2010-2022-yillar oralig'idagi ko'rsatkichlar asosida 2028-yilgacha bo'ladigan taxminiy o'sishi tahlil qilingan. Shu o'rinda ARIMA modelining iqtisodiyotdagi ahamiyati, o'rni va vazifalari haqida so'z boradi.

Kalit so'zlar: *ARIMA, prognozlash, avtoregressiya, kengaytirilgan Dikki-Fyuller testi.*

ABSTRACT

This article uses ARIMA models to analyze the estimated growth of the Surkhandarya region's industry until 2028 based on indicators between 2010-2022. In this, we will talk a little about the importance, role and tasks of the ARIMA model in the economy.

Keywords: ARIMA, forecasting, autoregression, Extended Dickey-Fuller test.

Rivojlanayotgan iqtisodiyotda prognozlash ahamiyatlidir. Prognozlashning ushbu sohada bir qancha mashhur va keng qo'llanilib kelayotgan turlari mavjud bo'lib, biz ARIMA modelidan Surxondaryo sanoatini modellashda foydalanamiz. Ilk prognozlash modellari 1950-yillarda qo'llanila boshlagan, keyinchalik ARIMA modelli 1970-yillarda Boks va Jenkinslar tomonidan yaratilgan. Shu sababli biz Surxondaryo viloyati sanoatlashtirishda ARIMA modellidan foydalanamiz.

1-jadval. Surxondaryo viloyati sanoati ko'rsatgichlari (mlrd so'm)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sanoat mahsuloti hajmi, mlrd. So'm	756,4	925,8	1101,8	1321,4	1615,3	1910,7	2200,7	2356,4	3234,7	4231,3	5322,7	6675,3	7229,8

Vaqtli qatorlarni modellashtirish uchun ARIMA modelidan foydalanildi.

ARIMA modellining umumiy ko'rinishi quidagicha[1]:

ARIMA(p, d, q)   (3.2.1)

[1] https://ru.wikipedia.org/wiki/ARIMA

Bu erda AR(p) – avtoregressiya; MA(q) – sirg'aluvchi o'rtacha; I(d) – integratsiyalashganlik.

Modelning formulasi quyidagicha[2]:

$$\Delta^d y_t = a + \sum_{i=1}^{p} b_1 \Delta^d y_{t-p} + \sum_{j=1}^{q} c_1 e_{t-q}$$

Odatda vaqtli qatorlarni ARIMA modellari bilan modellashtirishda vaqtli qator statsionar bo'lishi kerak. Statsionarlikni aniqlash uchun vaqtli qatorning grafigini ko'zdan kechiramiz (1- rasm).

1-rasm Surxondaryo viloyati sanoat hajmining 2010-2022-yillardagi chizmasi (mlrd so'mda)[3].
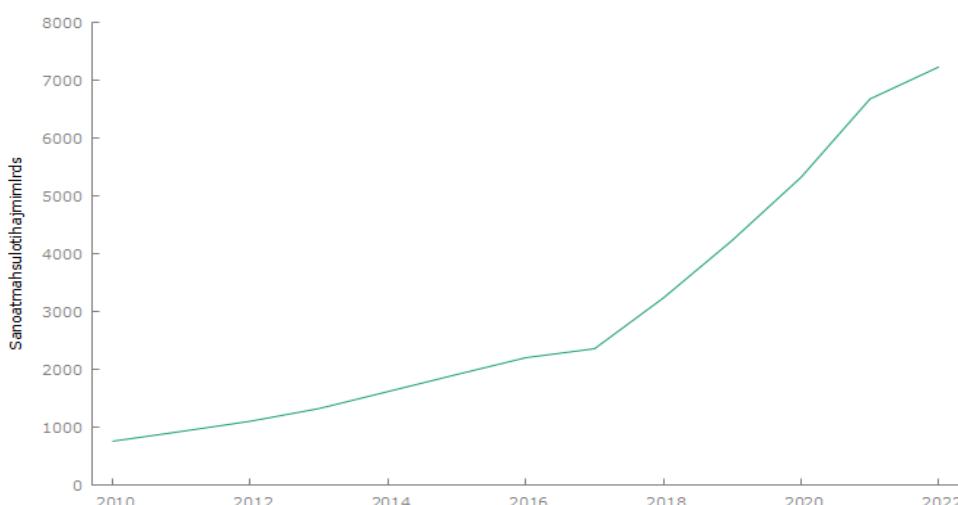
Diagrammada keltirilgan vaqtli qator darajalari statsionar emas. Shu sababli vaqtli qatorni statsionar bo'lishiga erishish uchun $y_t - y_{t-1} = \Delta y_t$ amalini bajaramiz. Shu holatda yana Δy_t ning stationar ekanligini tekshirishimiz kerak.

Birinchi farqlarninig stationar ekanligini kengaytirilgan Dikki-Fyuller testi orqali tekshiramiz (1-jadval).

2-jadval kengaytirilgan Dikki-Fyuller testi[4]

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[2] https://ru.wikipedia.org/wiki/ARIMA
[3] https://www.surxonstat.uz/uz/ asosida mualif ishlanmasi
[4] https://gretl.sourceforge.net/ru.html asosida mualif ishlanmasi

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Augmented Dickey-Fuller test for d_Sanoat_mahsuloti_hajmi
testing down from 4 lags, criterion AIC
sample size 7
unit-root null hypothesis: a = 1

  test without constant
  including 4 lags of (1-L)d_Sanoatmahsulotihajmimlrds
  model: (1-L)y = (a-1)*y(-1) + ... + e
  estimated value of (a - 1): 1,78036
  test statistic: tau_nc(1) = 1,60071
  asymptotic p-value 0,9737
  1st-order autocorrelation coeff. for e: -0,041
  lagged differences: F(4, 2) = 1,554 [0,4276]

  test with constant
  including 4 lags of (1-L)d_Sanoatmahsulotihajmimlrds
  model: (1-L)y = b0 + (a-1)*y(-1) + ... + e
  estimated value of (a - 1): 9,08701
  test statistic: tau_c(1) = 3,1514
  asymptotic p-value 1
  1st-order autocorrelation coeff. for e: -0,593
  lagged differences: F(4, 1) = 5,447 [0,3096]

2-jadvalgadagi p-qiymatining ahamiyatlilik darajasi 0.05, 0.01 yoki 0.1 dan kichik bo'lishi lozim. Biroq bizda teskari holat. Demak, jadvalga ko'ra birinchi farqlar ham stationar emas. Shu sababli 2-chi farqlarga o'tamiz. Bundan ARIMA modelining integratsiyalanga tartibi 2 ekanligi, ya'ni I(2) (yoki d=2) kelib chiqadi.

Navbatdagi bosqichda AR va MA tartibini aniqlaymiz. Buning uchun korrellagrammaga nazar tashlaymiz. (2–rasm).

2- rasm. Surxondaryo viloyati sanoati bo'yicha avtokorellatsiya funksiyasi grafik xususiyatlari[5].
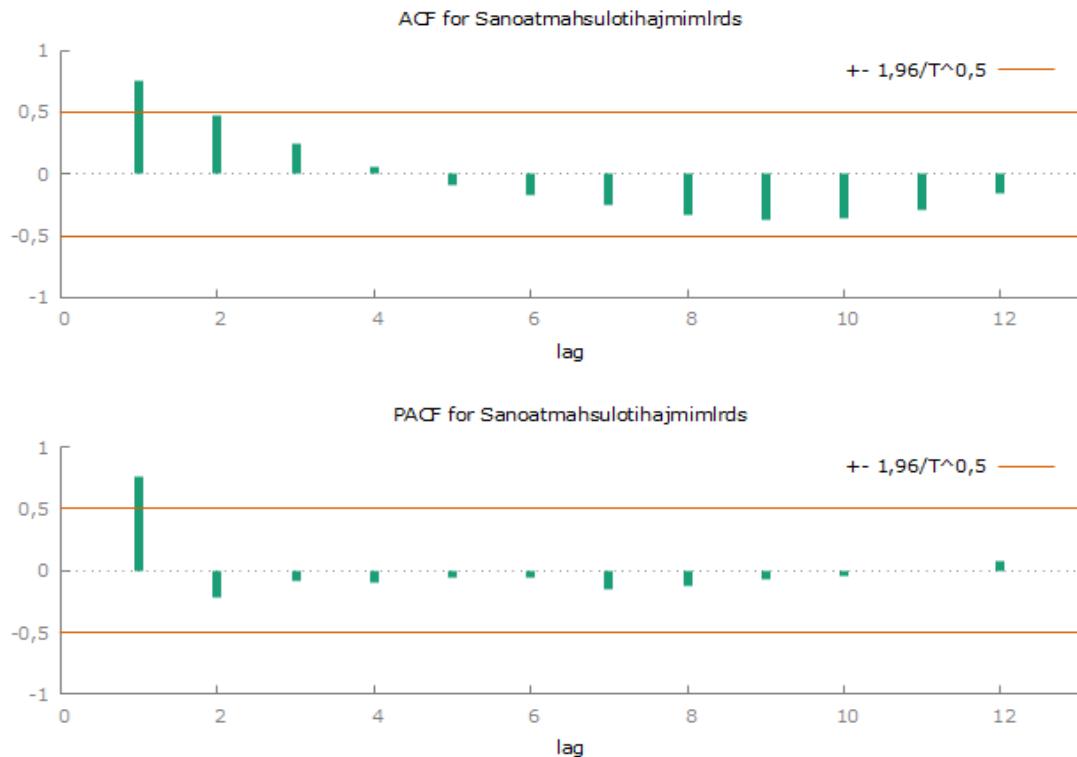
1-rasmdan ko'rinib turibdiki jarayon avtoregressiya holatiga xos bo'lib, MA tartibi (0) va AR tartibi (1) ni tashkil etadi.

Demak, ARIMA 2- rasmni tajriba qilib ko'ramiz. Tajribalarda model parametrlarini ahamiyatli bo'lmadi shu sababli AR va MA ning boshqa boshqa tartiblarini sinab ko'ramiz. Biz AR va MA ning boshqa tartiblarini analizni ko'rganimizda qo'yidagicha natija berdi.

3- jadval[6] regression tahlil natijalari

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[5] https://gretl.sourceforge.net/ru.html mualif ishlanmasi
[6] ARIMA modelida mualif ishlanmasi

Model 1: ARIMA, using observations 2012-2022 (T = 11)
Dependent variable: (1-L)^2 Sanoat mahsuloti hajmi mlrds
Standard errors based on Hessian

	Coefficient	Std. Error	Z	p-value	
phi_4	−0,576638	0,241300	−2,390	0,0169	**

Mean dependent var	35,00422	S.D. dependent var	355,2955
Mean of innovations	70,06756	S.D. of innovations	270,4724
R-squared	0,985136	Adjusted R-squared	0,985136
Log-likelihood	−78,01866	Akaike criterion	160,0373
Schwarz criterion	160,8331	Hannan-Quinn	159,5357

		Real	Imaginary	Modulus	Frequency
AR					
	Root 1	0,8114	-0,8114	1,1476	-0,1250
	Root 2	0,8114	0,8114	1,1476	0,1250
	Root 3	-0,8114	-0,8114	1,1476	-0,3750
	Root 4	-0,8114	0,8114	1,1476	0,3750

3-jadvalga ko'ra model parametrlari ahamiyatli. Uning approksimatsiya xatoligi MAPE=4% bu esa 15% dan kichik ya'niy biz ishlab chiqqan model iqtisodiy jarayonga mos.

Modeldan foydalangan xolda Surxondaryo sanoatini 2022-2028-yillar oralig'idagi o'sish sur'atini pragnoz qilamiz.

4-rasm. Prognoz
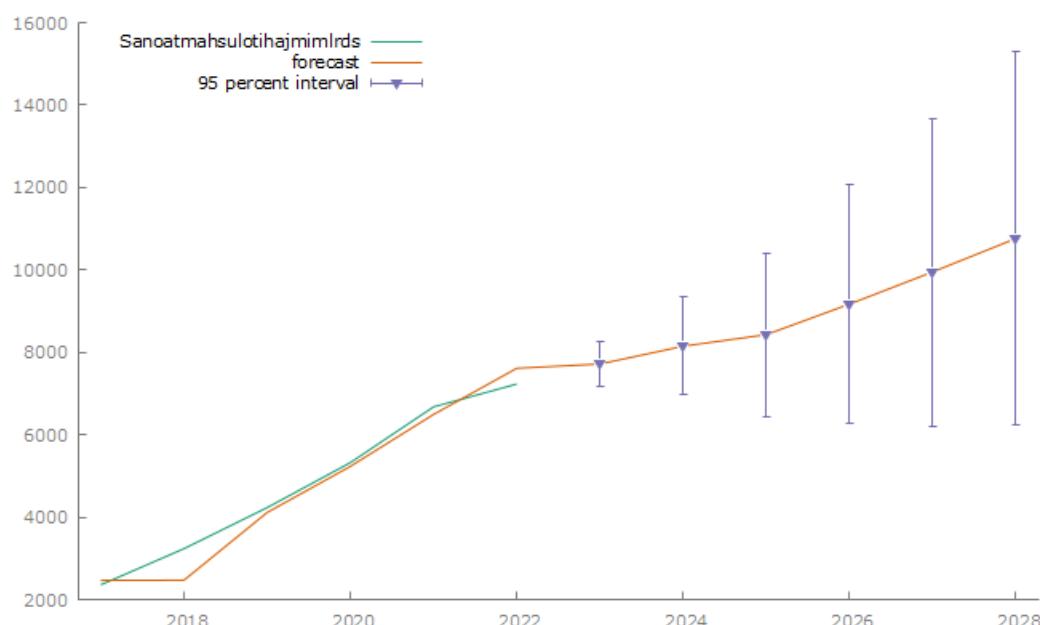
Ishlab chiqilgan pragnoz modelimiz shuni ko'rsatadiki, 2028-yilga kelib Surxondaryo sanaot rivojlanishi 10762.2 mlrd so'mni tashkil etishi mumkin. Bu ko'rsatgich 2022-yilga nisbatan ya'ni 7611,31 mlrd sumga taqqoslaganda 3150. 89 mlrd ko'proq summani tashkil etadi.

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