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PRIORITIES AND FORECASTING OF SUSTAINABLE ECONOMIC DEVELOPMENT OF KHOREZM REGION

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АННОТАЦИЯ

Ушбу мақолада ҳудудларнинг барқарор ривожланишини ифодаловчи статистик кўрсаткичлар тизимини дескриптив таҳлили, ҳудудларнинг барқарор ривожланишини аҳоли турмуш даражасига трансформациясини эконометрик моделлари, Хоразм вилоятининг иқтисодиётини барқарор ривожланишини статистик баҳолаш илмий тадқиқ этилган.

АННОТАЦИЯ

В данной статье проведен описательный анализ системы статистических показателей, характеризующих устойчивое развитие регионов, изучены эконометрические модели трансформации устойчивого развития регионов в уровень жизни населения, статистическая оценка устойчивого развития экономики Хорезмской области.

ANNOTATION

In this article, a descriptive analysis of the system of statistical indicators that characterize the sustainable development of the regions, econometric models of the transformation of the sustainable development of the regions into the standard of living of the population, statistical evaluation of the sustainable development of the Khorezm region's economy are studied.

Калит сўзлар: барқарор ривожланиш, иқтисодий, ижтимоий, маданий ва экологик фаровонлик, ресурс, статистик индикатор, статистик гуруҳлаш, қашшоқлик даражаси, кам таъминланганлик даражаси, вариация, диспропорция, сифат омиллари.

Ключевые слова: устойчивое развитие, экономическое, социальное, культурное и экологическое благополучие, ресурсы, статистический показатель, статистическая группировка, уровень бедности, уровень низкого дохода, вариации, дисперсия, качественные факторы.

Keywords: sustainable development, economic, social, cultural and environmental well-being, resource, statistical indicator, statistical grouping, poverty rate, low-income level, variation, dispersion, quality factors

INTRODUCTION

The lack of mineral deposits in Khorezm region and the high cost of transportation of raw materials from other regions of the country and the high cost of transportation of finished products create great difficulties in organizing the production of building materials from local raw materials, including attracting investors. Therefore, it is necessary to take measures to reduce tariffs for rail transportation of raw materials used in the production of building

materials (gypsum, lime, natural decorative stones, basalt products, ceramic tiles and products, glass products, drywall, etc.). In addition, it is necessary to provide practical assistance in issuing licenses for large projects in the Republic of Karakalpakstan and Navoi region, if necessary. These areas are one of the priorities for the sustainable development of the economy of Khorezm region.

DISCUSSION

In 2020, Khorezm region will receive 585.2 billion soums from 712 enterprises in the field of construction materials. In 2021, a total of 791 enterprises produced goods worth 670.8 billion soums, while the growth rate was 103.4%. The region mainly produces specialized construction materials in 2 districts: Tuproqqala and Khazarasp. This means that the development of the sector has a high impact on the sustainable development indicators of the region.

It is necessary to further develop the construction industry in the region, as it is expected to increase the volume of other sectors of the region, such as industrial products, services and exports. These will create new jobs for the poor and a permanent source of income.

In addition, changes in the demographic situation in Khorezm region , increasing the level of employment by creating new jobs in the region, thereby reducing unemployment and increasing the share of small business and private entrepreneurship in the regional economy were identified.

It is necessary to encourage the implementation of "digital" projects in the industrial, agricultural and service sectors of the region, including the digitization of production processes in the private sector. As part of the implementation of the Strategy "Digital Uzbekistan - 2030" it is necessary to take measures to ensure the sustainable development of all khokimiyats, ministries and departments in the Khorezm region through the full introduction of the digital economy.

There are different ways of forecasting based on statistics for Khorezm region. The data types we use are forecast types developed on the basis of time series.

Style. Several forecasting methods are used in time series. There are MAPE, MAD, and MSD indicators that represent error quality in determining the optimal type of forecasting methods. These indicators measure the error between the values of the forecasting methods and the data provided.

MAPE to the results of the forecasting method is the average of the sum:

$$\text{MAPE} = \frac{\sum \frac{|e_t|}{Y_t}}{n} \qquad (1)$$

MAD represents the average of absolute errors:

$$\text{MAD} = \frac{\sum |e_t|}{n} \qquad (2)$$

MSD absolute errors squares represents the average:

$$\text{MAD} = \frac{\sum |e_t^2|}{n} \qquad (3)$$

In the forecasting methods used, the method with the lowest results, which explains their reliability, is the most optimal forecasting method, and the forecast indicators calculated on the basis of this optimal method are more accurate.

We use three trend methods and one grinding method to determine the forecast values. The main reason for this is that the indicators are non-stationary and there is a trend factor in their change. Of the trend methods, linear, quadratic, and exponential are acceptable. Holt Winter seasonal , one of the grinding methods , covers the trend, seasonality and level of grinding, which means that this method is one of the advantages.

Grinding methods are determined on the basis of levels, the level is from 0 to 1. Three types of grinding are widely used in scientific research, including exponential grinding, Double exponential grinding , and Holt Winter seasonal grinding.

only in the exponential grinding method αdetermines the degree of grinding of the method, this method is characterized as follows:

$$\hat{x} = \alpha x_t + \alpha(1-\alpha)x_{t-1} + \alpha(1-\alpha)^2 x_{t-2} + .. (2)$$

Double exponential grinding , Holt Winter seasonal grinding types are represented in the same way.

equation (2) with (t-1) and multiplying both sides by (1- α) gives the following equation:

$$\widehat{(1-\alpha)}x_{t-1} = \alpha(1-\alpha)x_{t-1} + \alpha(1-\alpha)^2 x_{t-2} + \alpha(1-\alpha)^3 x_{t-3} + .. (3)$$

Substituting the second equation from equation (3), we obtain the following equation:

$$\widehat{x_t} = \widehat{(1-\alpha)}x_{t-1} + \alpha x_t 0 << \alpha 1$$

This equation is the final equation of exponential grinding and is the $\widehat{x_t}$actual level of the forecast values .x_t

Double exponential grinding the trend level is added along with the grinding rate in the method. It is advisable to use the Double exponential grinding method when the forecast indicator is trending .

$$\bar{x}_t = (1-\alpha)(\bar{x}_{t-1} + T_{t-1}) + \alpha x_t \qquad (0 < \alpha < 1)$$
$$T_t = (1-\beta)T_{t-1} + \beta(\hat{x}_t - \hat{x}_{t-1}) \qquad (0 < \beta < 1)$$

Holt Winter seasonal grinding method is defined as follows.

$$\hat{x}_t = (1-\alpha)(\hat{x}_{t-1} + T_{t-1}) + \alpha\frac{x_t}{F_{t-x}} \qquad (0 < \alpha < 1)$$
$$T_t = (1-\beta)T_{t-1} + \beta(\hat{x}_t - \hat{x}_{t-1}) \qquad (0 < \beta < 1)$$
$$F_t = (1-\gamma)F_{t-x} + \gamma\frac{x_t}{\hat{x}_t} \qquad (0 < \gamma < 1)$$

Bundaα trend level , βtrend level, γseasonality level. If there is a trend, seasonality in the study, the Holt Winter seasonal grinding method is the most optimal, however, as we mentioned earlier, using three trend methods and one grinding method, we select their optimal model by comparing their errors using MAPE, MAD and MSD. based on forecast values.

METHOD

We conduct a forecast study for Khorezm region. In previous chapters of our dissertation, factors such as population growth rate, employment rate, unemployment rate and the share of small business and private entrepreneurship in GRP were selected for this region . program [1].

Table 1 Forecasting methods for factor characteristics of Khorezm region

№	Types of forecast models	MAPE	MAD	MSD
Population growth rate,% (PGR_R) - X_2				
1	$Y_t = 101,694 + 0,00402597 * t$	0.15	0.16	0.04
2	$Y_t = 101,594 + 0,0301456 * t - 0,00118726 * t^2$	0.14	0.15	0.04
3	$Y_t = 101,594 + 0,0301456 * t - 0,00118726 * t^2$	0.15	0.16	0.04
4	Smoothing Constants Alpha (level) 0.5 Gamma (trend) 0.3 Delta (seasonal) 0.4	0.19	0.19	0.07
Employment rate,% (ER_R) - X_5				
1	$Y_t = 62,7886 + 0,116623 * t$	1.4	0.9	1,2
2	$Y_t = 64.0442 - 0.210935 * t + 0.0148890 * t^2$	1,2	0.7	1.0
3	$Y_t = 62.7956 * (1.00181^t)$	1.4	0.9	1,2
4	Smoothing Constants Alpha (level) 0.5 Gamma (trend) 0.3 Delta (seasonal) 0.4	1.1	0.7	1.0
Unemployment rate,% ($U R_R$) - X_6				
1	$Y_t = -0.448095 + 0.448961 * t$	44.1	0.9	1.3
2	$Y_t = 0,120451 + 0,300645 * t + 0,00674166 * t^2$	37.3	0.9	1,2
3	$Y_t = 0.692725 * (1.14882^t)$	36.8	1.1	2.3
4	Smoothing Constants Alpha (level) 0.5 Gamma (trend) 0.3 Delta (seasonal) 0.4	27.9	0.8	1.8
Share of small business and private entrepreneurship in GRP,% ($SBPE_{GRP}$) - X_9				
1	$Y_t = 49.8357 + 1.47857 * t$	2.3	1.6	5.0
2	$Y_t = 47,1556 + 2,17772 * t - 0,0317795 * t^2$	1.7	1,2	3.9
3	$Y_t = 50,8894 * (1,02312^t)$	2.9	1.9	6.5
4	Smoothing Constants Alpha (level) 0.5 Gamma (trend) 0.3 Delta (seasonal) 0.4	2.1	1.5	8.0

If we analyze the table above carefully, all the factor characters The Holt Winter seasonal grinding method is the most optimal because the MAPE, MAD, and MSD quality indicators indicate that there is less error than other forecasting options.

Therefore, to better understand this situation , we develop graphs of Holt Winter seasonal grinding method, it should be noted that the trend level, βtrend level, seasonality level in γHolt Winter seasonal grinding method αdiffer in factors.

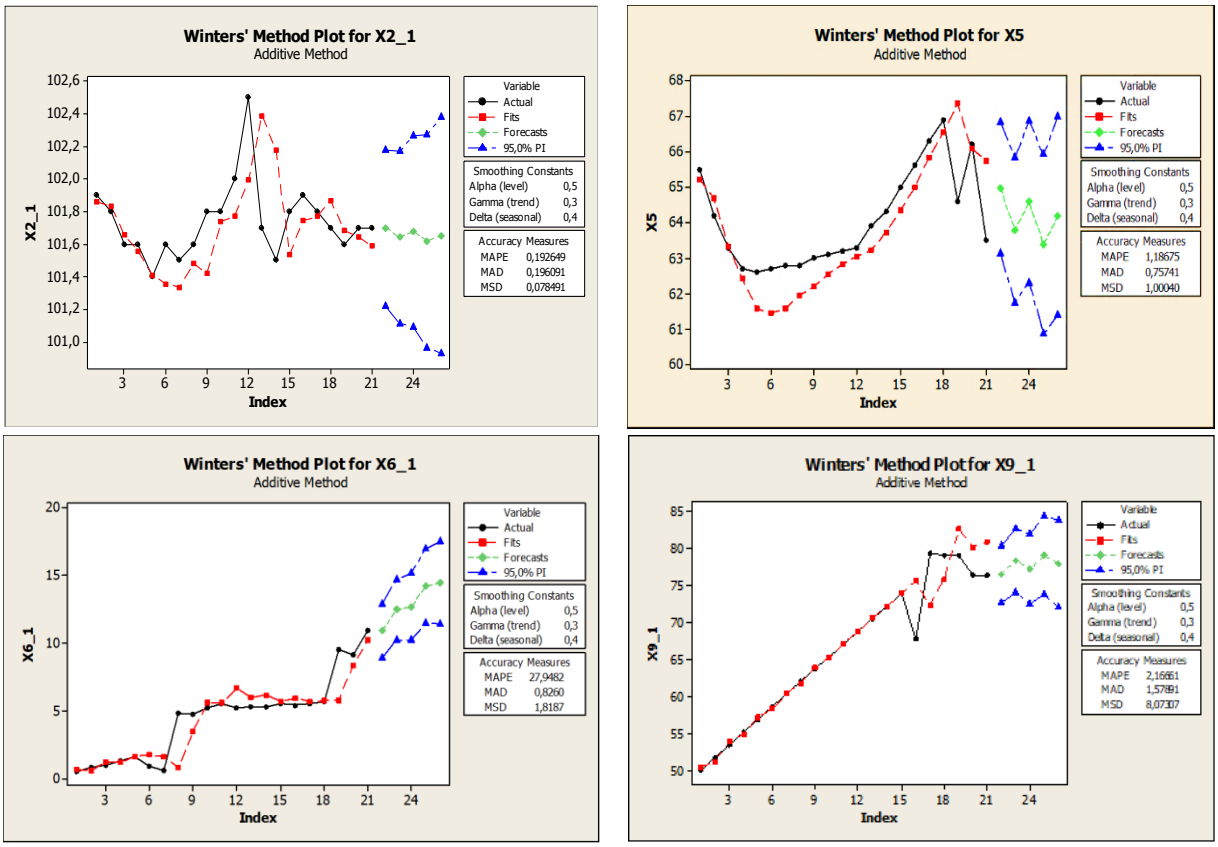

Figure 1. Diagrams of factor characters based on the Holt Winter seasonal method

If we look at the diagrams in the figure, the changes of each factor over time, their corresponding values, their forecasts and their state of 95% reliability are shown in the graph.

ANALYSIS

The mathematical expressions shown in the table above were evaluated for statistical significance. Based on these econometric models, we propose multivariate forecasts below.

Table 2 Medium-term forecast options for sustainable development indicators of Khorezm region

Years	Forecast	Optimistic	Pessimistic
Population growth rate,%			
202 2	101, 62 1	102,173	100,929
202 3	101,644	102,181	100,966
202 4	101.6 55	102,266	101,089
202 5	101.6 78	102,275	101,114
202 6	101, 701	102,381	101,220
Employment rate,%			
202 2	63,3837	65,8244	60,8549
202 3	63,7796	65.9125	61,3788
202 4	64,1842	66,8317	61,7349
202 5	64,5801	66,8528	62.3075
202 6	64.9761	66.9896	63,1205
Unemployment rate,%			

202 2	14,4495	17.5090	11,4828
202 3	14,2406	16.9985	11,3899
202 4	12,4654	15,1528	10.2354
202 5	12,6743	14,6954	10,1957
202 6	10,8990	12,9228	8,8753
Share of small business and private entrepreneurship in GRP,%			
202 2	76,5338	80.4021	72,0087
202 3	77,1954	81,9330	72,4578
202 4	77,8570	82,6114	72,6656
202 5	78,3488	83,7052	73,7388
202 6	79,0104	84,2819	74.0862
Poverty rate,%			
202 2	11.7	5.3	19.4
202 3	10.9	3.9	18.7
202 4	10.7	2.9	18.6
202 5	10.0	1,2	18.1
202 6	9.8	0.1	18.0

As can be seen from the table above, one of the indicators of sustainable development of Khorezm region, ie the goal of our study, is to reduce the level of poverty from 13.0% in 2020 to 9.8% in 2026. To do this, it is necessary to ensure a stable population growth rate, increase employment, reduce unemployment and increase the share of small business and private entrepreneurship in the economic growth of the region.

CONCLUSION

In the proposed forecast options for Khorezm region, it is expedient to take into account the changes in the population in the regions and the number of labor resources expected to enter each year. In short, in order to reduce poverty in Khorezm region, it is necessary to do the following:

- Over the next five years, the average population growth rate should increase by 101.7%, or about 1.1 times the population by 2026 compared to 2021;
- It is necessary to ensure a corresponding increase in employment, taking into account the growth of the population in the region, which is projected to increase by 2.0% over the next five years;
- As a result of the measures taken, the unemployment rate will decrease from 10.9% in 2020 to 8.9% in 2026 on the basis of econometric models;
- The share of the region in the regional economy will increase from 76.3% in 2020 to 84.3% by 2026 through the development of small business and private entrepreneurship;
- By achieving the above indicators, the level of poverty in khorezm region will be reduced from 13.0% in 2020 to 9.8% by 2026.

As a result, the indicators of sustainable development in the region will improve and the level of poverty in the country will decrease.

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