POSSIBILITIES OF INCREASING THE NUMBER OF TOURISTS IN THE KASHKADARYA REGION THROUGH THE USE OF TIME SERIES SMOOTHING METHODS

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Abstract:

The article proposes to develop the possibilities of increasing the number of tourists entering the Kashkadarya region through the use of time series smoothing methods by expanding the period interval, calculating the moving average and analytical smoothing methods.

Keywords: Kashkadarya region, time series, expanding the period interval, calculating the moving average, analytical smoothing methods, tourist.

VAQTLI QATOR BOʻYICHA TEKISLASH USULLARIDAN FOYDALANISH ORQALI QASHQADARYO VILOYATIGA KIRUVCHI TURISTLAR SONI OSHIRISH IMKONIYATLARI

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Annotatsiya:
Maqolada vaqtli qator bo'yicha tekislash usullaridan foydalanish orqali Qashqadaryo viloyatiga kiruvchi turistlar sonini oshirish imkoniyatlarini davrlar oralig'ini kengaytirish, sirg'anchiqli o'rtacha hisoblash va analitik tekislash usullari orqali ishlab chiqish taklif qilingan.

Kalit so'zlar: Qashqadaryo viloyati**,** vaqtli qator, davrlar oralig'ini kengaytirish, sirg'anchiqli o'rtacha hisoblash, analitik tekislash usullari, turist,

Introduction

Today, in the context of the digital transition of the economy, the increase in the level of use of information and communication technologies is of great importance in the development of the tourism sector. The use of geoinformation systems in the digitalization of the tourism sector provides high efficiency. It satisfies the need for a database of tourist areas, tourist attractiveness, tourist resources, etc. As a result, the level of tourists visiting our country, our tourist attractive areas, increases. Therefore, below we will consider the degree of correlation between the indicators of the number of incoming tourists related to the use of geoinformation systems.

The correlation between the indicators of the number of incoming tourists related to the use of geoinformation systems limits the possibility of including them in a single model

Research Methodology

As a result of the study, time series smoothing methods were used. In this case, the following time series smoothing methods were used: expanding the period interval, moving averages and analytical smoothing methods.

Analysis and results:

The tourism development forecast is an integral part of the forecast for the development of the economy and social sphere of a particular region and the country as a whole. The interrelation between the level of economic development and the tourism sector leads to an increase in the standard of living of the population by stimulating the growth rates of certain sectors and contributes to an increase in the purchasing power of potential consumers and the demand for tourism services.

The statistical data on the number of tourists entering the Kashkadarya region for 2016-2024 are presented. In this article, based on statistical data for 2016-2024, we have implemented a time series sliding average smoothing method for the indicators of incoming tourists in terms of the potential for increasing the number of tourists entering the Kashkadarya region. For this, we will compile the following (Table 1):

1-Table

Years	2016	2017	2018	2019	2020	2021	2022	2023	2024
Incoming tourists, thousand people	116,0	148,1	151,7	160,2	163,5	57,1	81,4	120,4	140,5

We will consider the methods of smoothing the data in this table in a time series in the following forms.

- *expanding the period interval (3 years);*
- *calculating moving averages;*
- *analytical smoothing.*

We present the methods of expanding the period interval and calculating moving averages in the following (Table 2):

2-table

Years	Incoming tourists, thousand people	3rd year value	Average annual cost	Calculating moving average levels	Moving average
2016	116,0			-	-
2017	148,1			(116,0+148,1+151,7):3	138,6
2018	151,7	415,8	138,6	(148,1+151,7+160,2):3	153,3
2019	160,2			(151,7+160,2+163,5):3	158,4
2020	163,5			(160,2+163,5+57,1):3	127,0
2021	57,1	380,7	126,9	(163,5+57,1+81,4):3	100,6
2022	81,4			(57,1+81,4+120,4):3	86,3
2023	120,4			(81,4+120,4+140,5):3	143,5
2024	140,5	342,3	114,1	-	-

As can be seen from the table data, it can be seen that the total value of services rendered has a dynamically changing direction in the series calculated by moving averages. Due to the global pandemic, the dynamics of continuous growth has changed to a variable state.

One of the most important methods for determining the trend in time series is analytical smoothing. In such conditions, the dynamic series is smoothed by the following equation:

$$Y_t = a_0 + a_1 t$$

where: t-time unit; a0-theoretical level; a1-parameters of the equation. And to determine the parameters, it is necessary to solve the following system of equations.

$$\begin{cases} a_0^{\,n} + a_1 \sum t = \sum Y \\ a_0 \sum t + a_1 \sum t^2 = \sum Y \cdot t \end{cases}$$

If $\sum t = 0$ then our equation will look like this:

$$\begin{cases} a_0{}^n = \sum Y \\ a_1 \sum t^2 = \sum Y \cdot t \end{cases} \rightarrow \begin{cases} a_0 = \dfrac{\sum Y}{n} \\ a_1 = \dfrac{\sum Y \cdot t}{\sum t^2} \end{cases}$$

We can find this system of equations and the parameters, and the following equations are formed.

$$a_0 = \frac{\sum Y}{n} = \frac{1138,9}{9} = 126,5, \quad a_1 = \frac{\sum Yt}{\sum t^2} = \frac{-228,7}{60} = -30$$

then, $Y_t = a_0 + a_1 t$, in the equation a_0 va a_1 to calculate equations, $\sum Y \sum t^2$ and $\sum t$ need to be determined.

Now, if we substitute the obtained values, our equation will look like this:
$$Y_t = 126,5 + (-3,8)_t$$

We use the above equation to calculate the unit of time, the square of the unit of time, the number of incoming tourists multiplied by the unit of time, and the formula is shown below (Table 3):

Years	Incoming tourists, thousand people	t	t^2	Yt	$Yt=126,5+(-3,8)\cdot t$
2016	116,0	-4	16	-464	$Y_t=126,5+(-3,8)\cdot(-4)=140,1$
2017	148,1	-3	9	-444,3	$Y_t=126,5+(-3,8)\cdot(-3)=136,7$
2018	151,7	-2	4	-303,3	$Y_t=126,5+(-3,8)\cdot(-2)=133,3$
2019	160,2	-1	1	-160,2	$Y_t=126,5+(-3,8)\cdot(-1)=129,9$
2020	163,5	0	0	0	$Y_t=126,5+(-3,8)\cdot(0)=126,5$
2021	57,1	1	1	57,1	$Y_t=126,5+(-3,8)\cdot((1)=123,1$
2022	81,4	2	4	162,8	$Y_t =126,5+(-3,8)\cdot(2)=119,7$
2023	120,4	3	9	361,2	$Y_t =126,5+(-3,8)\cdot(3)=116,3$
2024	140,5	4	16	562	$Y_t=126,5+(-3,8)\cdot(4)=112,9$
Σ	1138,5	0	60	-228,7	1138,5

Conclusion and Suggestions

In conclusion, it can be said that in the development of the tourism potential of the Kashkadarya region using time series smoothing methods, smoothing work was carried out on 3 parameters.

➢ 　□ expanding the period interval (3 years);
➢ 　□ calculating moving averages;
➢ 　□ analytical smoothing.

As a result, it can be seen that expanding the period interval and calculating moving averages have a dynamically changing direction in the total value of services provided in the time series. We can see that the dynamics of constant growth due to the global pandemic has a changing state.

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