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STATISTICAL ANALYSIS OF THE STATUS AND INDICATORS OF THE INTRODUCTION OF "NECESSARY PRODUCTION PRACTICE" (GMP) INTO THE PHARMACEUTICAL NETWORK OF THE REPUBLIC OF UZBEKISTAN

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Abstract: Maqolada O'zbekiston Respublikasi farmatsevtika tarmog'iga "Zarur ishlab chiqarish amaliyoti" (GMP)ning joriy etilganlik holati, mamlakatda ushbu sohani rivojlantirishga qaratilgan davlat dasturlari va rivojlantirish konsepsiyasini amalga oshirish ko'rsatkichlarining statistic tahlili ko'rib chiqilgan.
Keywords: farmatsevtika sanoati, ishlab chiqarishni modernizatsiyalash, GMP standarti, rivojlantirish konsepsiyasi, statistic tahlili.

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Abstract: В статье рассмотрена ситуация внедрения "необходимой производственной практики" (GMP) в фармацевтическую отрасль Республики Узбекистан, статистический анализ государственных программ, направленных на развитие этой отрасли в стране, и показателей реализации Концепции развития.
Keywords: фармацевтическая промышленность, модернизация производства, стандарт GMP, концепция развития, статистический анализ.

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Abstract: The article examines the status of the introduction of the "necessary production practice" (GMP)into the pharmaceutical network of the Republic of Uzbekistan, statistical analysis of the indicators of the implementation of state programs and the concept of development aimed at the development of this industry in the country.
Keywords: pharmaceutical industry, modernization of production, GMP standard, development concept, statistical analysis.

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Introduction

According to world practice, the pharmaceutical industry is one of the strategically important and rapidly developing sectors of the economy of any modern state.

Today, the rapid growth of population needs for quality pharmaceutical products and preparations and the systematic renewal of their content, the fierce innovation processes taking place in the world economy and the aggravation of Interstate economic competition, the formation of an effective structure for the production of pharmaceutical products and preparations corresponding to the changing market mining and, in this way, conducting an important

The reform of the pharmaceutical network is aimed at ensuring the safety of medicines in the country, modernizing the pharmaceutical sector, creating new production that requires deep knowledge and is high-tech, growing the export of pharmaceutical products and services, promoting advanced scientific and technological developments and minimizing dependence on foreign markets[2].

Based on the above points, it can be said that the research of changes in the production of the pharmaceutical industry is an urgent scientific issue, and therefore this article focuses on the issues of assessing changes in this network and in-depth research of significant quantitative changes in it. The article covers the state of introduction of "necessary production practices" (GMP) into the production of the pharmaceutical industry and statistical analysis of target indicators of the effectiveness of the implementation of the concept of development of the pharmaceutical network of the Republic of Uzbekistan in 2019 — 2024.

Analysis of the status of the introduction of the "necessary production practice" (GMP) into the pharmaceutical network

One of the pressing problems for domestic production today is the transition to GMP standards. The introduction of GMP standards is considered important, since from this, in terms of the development of the health sector, it decides their pricing policy in the field of mutual replacement, Public Procurement, drug insurance, drug provision.

In order to ensure the Coordination of work on state registration, standardization, certification, technical regulation of pharmaceutical products and the implementation of advanced foreign practices and international standards in the pharmaceutical network, on August 3, 2021, on the basis of the resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 486 on "additional measures to implement the requirements

The main tasks of the center are defined as:

- Organization of work on the implementation of international standards of necessary practices (GxP) in enterprises and organizations operating in the pharmaceutical network;

- Conducting pharmaceutical inspections for certification purposes in accordance with the requirements of necessary practices (GxP;

- Ensuring the harmonization of domestic standards of medicines, medical products and medical equipment produced in the Republic of Uzbekistan with international standards;

- coordination of international cooperation in the field of creation of medicines, medical products and medical equipment, regulation of production, circulation, quality control, implementation of the International Quality Management System "ISO" and the rules of necessary practices (GxP;

- inspection and conclusion of the quality system of foreign pharmaceutical production enterprises in the process of state registration of medicines in the established order.

At the same time, on January 21, 2022, the decree of the president of the Republic of Uzbekistan No. 55 "on additional measures for the rapid development of the pharmaceutical network of the Republic in 2022 — 2026"was mainly defined as:

- From April 1, 2022, new manufacturing enterprises, wholesale and retail trade organizations in the field of pharmaceutical will be organized in accordance with the requirements of "necessary production practice (GMP)", "necessary distribution practice (GDP)" and "necessary pharmaceutical (pharmacy) practice (GPP;

At the same time, on January 21, 2022, the decree of the president of the Republic of Uzbekistan No. 55 "on additional measures for the rapid development of the pharmaceutical network of the Republic in 2022 — 2026"was mainly defined as:

- From April 1, 2022, new manufacturing enterprises, wholesale and retail trade organizations in the field of pharmaceutical will be organized in accordance with the requirements of "necessary production practice (GMP)", "necessary distribution practice (GDP)" and "necessary pharmaceutical (pharmacy) practice (GPP; At the same time, on January 21, 2022, the decree of the president of the Republic of Uzbekistan No. 55 "on additional measures for the rapid development of the pharmaceutical network of the Republic in 2022 — 2026"was mainly defined as:

- From April 1, 2022, new manufacturing enterprises, wholesale and retail trade organizations in the field of pharmaceutical will be organized in accordance with the requirements of "necessary production practice (GMP)", "necessary distribution practice (GDP)" and "necessary pharmaceutical (pharmacy) practice (GPP;

The decree also defines the introduction of the following measures to support manufacturing organizations based on the requirements of "necessary production practices (GMP)" of medicines through the Export Promotion Agency of the Ministry of investment and foreign trade:

- Until January 1, 2025, up to 50% of the cost of transportation by road and rail transport when exporting pharmaceutical products to all countries, including bordering neighboring countries, but not more than 5% of the export value of products (without transportation costs) and 7% (in the case of transportation by road transport) provide subsidies for compensation;

- when goods are exported by exporting pharmaceutical organizations on the condition of late payment of payments on them, the revolver to replenish their working capital provides interest-free financial resources to commercial banks to finance loans. At the same time, loans at the expense of these resources are allocated for a delayed period and in the amount of the value of exported products, but not more than the equivalent of 3 million US dollars, with an annual rate of 4 percent (bank margin) for a period of up to a year.

The Basic Rules for the practice of GDP, GMP and GPP are as follows:-sifatni boshqarish;

- requirements for employees;
- requirements for buildings and equipment, rooms and fixtures;
- documents;
- technological process;
- quality control;
- activities that are granted for another organization to perform (outsourcing);
- complaints, quality defects and product recall; (complaints about medicines and medical products, their return, suspicions of forgery, and their withdrawal from circulation)
- Transportation by Transport (transportation)
-self-control.

The main achievements of the implementation of the necessary practices (GDP, GMP, GPP) are as follows:

- prevent the import of poor quality products;
- providing the population with quality, safe and hooligan drugs;
- clear determination of responsibility for ensuring the safety of pharmaceutical products;
- to ensure that employees perform the tasks assigned to them in good quality on time;
- change the approach to ensuring the quality and safety of pharmaceutical products, reducing the incidence of these defects and product recall cases;
- confirmation of confidence in the safety of pharmaceutical products by documents;
- creation of a quality system that meets international requirements;
- elimination of technical bars in the process of realization;
- to open a wide way for the export of domestic products to foreign countries and to ensure the competitiveness of domestic products;
- risk of entering the supply chain of counterfeit and low-quality drugs
- participation in tenders on public procurement of pharmaceutical products[1].

Over the past five years, the domestic pharmaceutical market has shown growth rates in the development of new types of products and an increase in production volumes.

At the same time, an analysis of the current state of the pharmaceutical network of the Republic of Uzbekistan showed that the local pharmaceutical network does not adequately satisfy the needs of the population and treatment and preventive institutions for pharmaceutical products.

In particular, the pharmaceutical industry lags behind such sectors of economically developed countries in terms of the types of products being released. The existing capacities of domestic manufacturers cover only 27% of the needs of the population and medical institutions for medicines and medical products.

Meanwhile, in developed foreign countries such as the United States, Germany and France, the pharmaceutical market of the domestic pharmaceutical industry is common.

Inadequate Organization of international standards at domestic manufacturing enterprises, including the introduction of the requirements of "necessary production practice" (GMP), "necessary pharmaceutical practice" (GVP) and ISO 13485, regulating the quality and safety of medicines at pharmaceutical enterprises, limits the possibility of producing competitive effective and safe pharmaceutical products in the foreign and domestic market.

In the distribution practice, the introduction of the "necessary pharmaceutical practice"(GDP) (GXP), aimed at managing the quality and safety system, in general, the clinical taking (GLP) and clinical research (GCP), which ensure its effectiveness and safety during the entire life cycle of the product, is also important.

To solve these problems in the pharmaceutical network of the Republic of Uzbekistan, the concept of development of the pharmaceutical network of the Republic of Uzbekistan (next – the concept) was developed in 2020 - 2024.

The main objectives of the concept are:

- aimed at organizing the sustainable activities of the pharmaceutical sector, ensuring the Prevention of diseases of the population, the effectiveness and high quality level of pharmacotherapy, ultimately helping to increase the duration and quality of human life.

- The main goals of the further development of the pharmaceutical network are aimed at transforming it into a strategic network of the national economy and the social sphere by implementing the following, as well as achieving the target indicators of this concept in accordance with Table 1:

improving the state system of quality control, registration and certification of pharmaceutical products and services;

to transfer the domestic production network to an innovative development model by coordinating the requirements of the "necessary production practice" (GMP) and create favorable conditions for increasing its competitiveness;

Organization of production of drug substations on the basis of deep processing of plant raw materials and development of technology for the synthesis of raw materials and the production of medicinal substances;

active involvement of foreign investment in the production of pharmaceutical products, advanced international experience and technologies.

This concept determines the following main indicators of the development of the pharmaceutical network of the Republic of Uzbekistan for the period up to 2024:

Target indicators of the effectiveness of the implementation of the concept of development of the pharmaceutical network of the Republic of Uzbekistan in 2019 — 2024

1-jadval

T/	Ko'rsatkichlar	2019-	2020-	2021-	2022-	2023-	2024-
1.	The expression of the volumes of luction of local drug forms in the earance of products (in percentages).	45	50	55	60	65	70
2.	Expression of the volumes of luction of local drug forms in the n of cash funds (in interest).	27	30	35	40	45	50
3.	The number of domestic drugs er development.	23	27	31	35	40	47
4.	The number of locally produced rmaceutical products allowed for use nedical practice in the Republic of ekistan.	2 918	3 100	3 450	3 800	4 150	4 500
5.	The number of locally produced rmaceutical products registered ad.	250	280	300	330	345	370
6.	Volume of export of pharmaceutical lucts (mln. Us doll.).	28	35	40	55	70	85
7.	Number of pharmaceutical prises.	191	196	203	209	215	220
8.	Foreign organization of production	4	6	10	14	18	20

	zbekistan farmatsevtika number of panies.						
9.	The number of pharmaceutical prises with GMP certification (in nt).	9	40	70	100	100	100
10.	The number of specialists in the maceutical network who have passed ssional training, including training nternational practice, rules and lards.	200	250	300	400	500	600

Below we have listed 4 statistical analysis of the indicators found in relation to the" necessary production practice " (GMP). In this case, 4 time series of values \ u200b \ u200bof the indicators were written, and for each row:

1. The main factors affecting the change in row levels have been identified (row grinding);

2. The series levels were predicted (forecast) and the series levels were calculated for the subsequent values of the time.

1. Expression of the volumes of production of local drug forms in product form(in percentages), Xi (t);

2. Number of pharmaceutical enterprises with GMP certification (in percent), Xi (t);

3. Number of pharmaceutical enterprises;

4. Volume of export of pharmaceutical products (mln. Us doll.), Xi (t).

Statistical analysis

1. Time series and its characteristic.

The study of the patterns of change of phenomena by Time is considered one of the main issues of Statistics.

Such issues are solved mainly by drawing up a time series and its analysis.

The sequence of statistical data values at one moment of time or at a certain period of time is a time series.

The statistical data values that make up a time series are referred to as the rank level. A timed array is expressed in most cases in the form of a table or graph.

To analyse a time series means to solve the following issues:

1. Determination of the main factors affecting the change in row levels (row grinding);

2. Predict (forecast) row levels and calculate row levels for subsequent values of time.

3. Interpolation – finding the unknown array level for the intermediate value of time according to the adjacent levels given;

4. Expressing the link between levels of one or more time series;

5. Interpretation and analysis of periodic variations of row levels.

We limit ourselves to considering the solution of issues 1 and 2, which are the main ones[4].

Level (exponential) grinding method

Let the sequence of values of the time series Levels be given as follows:

X_i	X_1	X_2	X_3	. ..	X_n
t_i	T_1	T_2	T_3	. ..	T_n

The main factor influencing the change in the levels of this series is, $X(t) = \overline{X}(t) + \varepsilon(t)$ it is necessary to determine the determinant in the expression. This process is called Row grinding.

When grinding a row, the connection between the row levels and the time ($\overline{X}(t) = f(x)$) after the appearance is determined, it is necessary to calculate the coefficients of the bond expressions, in which the method of small squares is often used.

The degrees of a timed row are calculated in the following recursive formulas when polished by a level method. For First-Order grinding:

$\overline{X}_i^{(1)} = \alpha \cdot \overline{X}_I^{(0)} + (1 - \alpha) \cdot \overline{X}_{i-1}^{(1)}$ (1)

and for K-order grinding

$\overline{X}_i^{(K)} = \alpha \cdot \overline{X}_i^{(K-1)} + (1 - \alpha) \cdot \overline{X}_{i-1}^{(K)}$ (2)

will be visible.

From this place $\overline{X}_i^{(1)}$ - X_i the First-Order average value found for a given value of the array: α - the level grinding parameter is often α=2/(n+1) is found in the expression if α=1 if the polished array values are equal to the given array levels; $\overline{X}_{i-1}^{(1)}$ – X_i row previous X_{i-1} is the First-Order, degree mean found for the value of; $X_i^{(K)}$ – The average value of the order K found for a given value of the line Xi; the value of n (grinding range) in the slip mean value and level methods

3 ga (n=3) is taken equal (the error is reduced). (2) as can be seen from the expression, with an increase in the grinding order, the level of the weight coefficient increases, that is, the value of the weight coefficient decreases like the value of the level function, so this method is referred to as Level grinding. In order 1 and 2 grinding, the first hadi value of the row is equal to the value of the polished

row, i.e. $\overline{X}_1^{(1)}=X_1$ va $\overline{X}_1^{(2)}=\overline{X}_1^{(1)}=X_1$ the rest had the value of (1) and (2) is formed with to put the value into the expression.

Predict time series levels

When planning production, technology and commodity, according to the indicators of previous years, the plans of the (coming) years are determined. This process is brought to the solution of the following issues.

a) indicators of past years (X_1, X_2, . . . , X_n) on the mathematical model of the change in the degrees of a timed series is written;

b) planning a time series level for the tn+k value of time according to a written mathematical model X_{n+k} the value is written.

The smallest squares and Level grinding methods are considered the most convenient when solving both of the above issues.

When solving issue 1, the method of small squares is used [4].

We cite the basic formulas of the smallest squares and Level grinding methods used in solving Issue 2 in such a way that issues are convenient to solve without causing:

a) by the method of the smallest squares; $\overline{X}(t_i)=a+b(t_i-\bar{t})$ – straight line model, (3)

$\overline{X}(t_i)=a+b(t_i-\bar{t})+c(t_i-\bar{t})^2$ - linear quadratic model. (4)

б) by Level grinding method; $\overline{X}(t+\Delta t)=a_0+a_1\Delta t$ - straight line model, (5)

bu erdan a_0 va a_1 koeffitsiyentlar:

$a_0=2\overline{X}^{(1)}(t)-\overline{X}^{(2)}(t)$

$a_1=\alpha/((1-\alpha)\cdot(\overline{X}^{(1)}(t)-\overline{X}^{(2)}(t)))$ (6)

found in formulas. $\overline{X}(t+\Delta t)=a_0+a_1\Delta t+a_2.\Delta t^2/2$ (7)

linear quadratic model, from here a_0, a_1 va a_2 koeffitsiyentlar:

$a_0=3(\overline{X}^{(1)}(t)-\overline{X}^{(2)}(t))+\overline{X}^{(3)}(t)$;

$a_1=\alpha/(2(1-\alpha)^2)((6-5\alpha)\overline{X}^{(1)}(t)-2(5-4\alpha)\overline{X}^{(2)}(t)+(4-3\alpha)\overline{X}^{(3)}(t)$;

$a_2=\alpha/((1-\alpha)^2)\cdot(\overline{X}^{(1)}(t)-2\overline{X}^{(2)}(t)+\overline{X}^{(3)}(t))$. (8)

(5) va (7) is the time interval that the theory in equations t plans.

We perform calculations in the above methods for each of the timed rows compiled from the values of the indicators in Table 1 (we bring the calculations only for Table 2, the results are presented in tables 3,4,5) : I. The expression of the volumes of production of local drug forms in the form of products **(*foizlarda*), $X_i(t)$.**

Target indicators of the effectiveness of the implementation of the concept of development of the pharmaceutical network of the Republic of Uzbekistan in 2019 — 20242-jadval

		2019 y.					

N	INDICATORS \ YEARS		2020	2021	2022	2023	2024
1.	Expression of the volumes of uction of local drug forms in product (in percentages). $X_i(t)$	45	50	55	60	65	70
2.	$\bar{X}_i^{(1)}(t)$	45	47,5	52,5	57,5	61,75	65,75
3.	$\bar{X}_i^{(2)}(t)$	45	46,25	50,00	57,25	53,97	52,96
4.	$\bar{X}_i^{(3)}(t)$	45	45,63	48,13	53,63		

I.

i=1. $\bar{X}_i^{(i)} = \alpha \cdot X_i + (1-\alpha) \cdot \bar{X}_{i-1}^{(1)}$; $\alpha = 0{,}5$; $\bar{X}_1^{(1)} = 0{,}5 \cdot X_1 + (1-0{,}5) \cdot \bar{X}_{1-1}^{(1)} = 0{,}5(X_i + \bar{X}_0^{(1)}) = X_1 = 45$;

i=2. $\bar{X}_2^{(1)} = \alpha \cdot X_2 + (1-\alpha) \cdot \bar{X}_1^{(1)} = 0{,}5 \cdot 50 + (1-0{,}5) \cdot 45 = 25 + 22{,}5 = 47{,}5$;

i=3. $\bar{X}_3^{(1)} = \alpha \cdot X_3 + (1-\alpha) \cdot \bar{X}_2^{(1)} = 0{,}5 \cdot 55 + (1-0{,}5) \cdot 50 = 27{,}5 + 25 = 52{,}5$;

i=4. $\bar{X}_4^{(1)} = \alpha \cdot X_4 + (1-\alpha) \cdot \bar{X}_3^{(1)} = 0{,}5 \cdot 60 + (1-0{,}5) \cdot 55 = 30 + 27{,}5 = 57{,}5$;

II.

i=1. $\bar{X}_i^{(i)} = \alpha \cdot X_i + (1-\alpha) \cdot \bar{X}_{i-1}^{(1)}$; $\alpha = 0{,}5$; $\bar{X}_1^{(2)} = 0{,}5 \cdot X_1 + (1-0{,}5) \cdot \bar{X}_{1-1}^{(1)} = 0{,}5(X_i + \bar{X}_0^{(1)}) = X_1 = 45$;

i=2. $\bar{X}_2^{(2)} = \alpha \cdot X_2 + (1-\alpha) \cdot \bar{X}_1^{(2)} = 0{,}5 \cdot 47{,}5 + (1-0{,}5) \cdot 45 = 23{,}75 + 22{,}5 = 46{,}25$;

i=3. $\bar{X}_3^{(2)} = \alpha \cdot X_3 + (1-\alpha) \cdot \bar{X}_2^{(2)} = 0{,}5 \cdot 52{,}5 + (1-0{,}5) \cdot 47{,}5 = 26{,}25 + 23{,}75 = 50{,}0$;

i=4. $\bar{X}_4^{(2)} = \alpha \cdot X_4 + (1-\alpha) \cdot \bar{X}_3^{(2)} = 0{,}5 \cdot 57{,}5 + (1-0{,}5) \cdot 52{,}5 = 28{,}75 + 26{,}5 = 57{,}25$;

III.

i=1. $\bar{X}_i^{(i)} = \alpha \cdot X_i + (1-\alpha) \cdot \bar{X}_{i-1}^{(1)}$; $\alpha = 0{,}5$; $\bar{X}_1^{(3)} = 0{,}5 \cdot X_1 + (1-0{,}5) \cdot \bar{X}_{1-1}^{(1)} = 0{,}5(X_i + \bar{X}_0^{(1)}) = X_1 = 45$;

i=2. $\bar{X}_2^{(3)} = \alpha \cdot X_2 + (1-\alpha) \cdot \bar{X}_1^{(3)} = 0{,}5 \cdot 46{,}25 + (1-0{,}5) \cdot 45 = 23{,}13 + 22{,}5 = 45{,}63$;

i=3. $\bar{X}_3^{(3)} = \alpha \cdot X_3 + (1-\alpha) \cdot \bar{X}_2^{(3)} = 0{,}5 \cdot 50{,}0 + (1-0{,}5) \cdot 46{,}25 = 25{,}00 + 23{,}13 = 48{,}13$;

i=4. $\bar{X}_4^{(3)} = \alpha \cdot X_4 + (1-\alpha) \cdot \bar{X}_3^{(3)} = 0{,}5 \cdot 57{,}25 + (1-0{,}5) \cdot 50{,}0 = 28{,}63 + 25{,}0 = 53{,}63$;

IV.

$\bar{X}(t+\Delta t) = a_o + a_1 \cdot \Delta t$;

$a_o = 2\bar{X}_4^{(1)}(t) - \bar{X}_4^{(2)}(t)$;

$a_1 = \alpha / ((1-\alpha) \cdot (\bar{X}_4^{(1)}(t) - \bar{X}_4^{(2)}(t))$;

$a_o = 2\bar{X}_4^{(1)}(t) - \bar{X}_4^{(2)}(t) = 2 \cdot 57{,}5 - 57{,}25 = 115 - 57{,}25 = 57{,}75$;

$a_1 = \alpha / ((1-\alpha) \cdot (\bar{X}_4^{(1)}(t) - \bar{X}_4^{(2)}(t)) = 0{,}5 / (0{,}5 \cdot (57{,}5 - 57{,}25)) = 1/0{,}25 = 4$;

$\Delta t = 1$; $\bar{X}(t+\Delta t) = a_o + a_1 \cdot \Delta t = 57{,}75 + 4 \cdot 1 = 61{,}75$;

$\Delta t = 2$; $\bar{X}(t+\Delta t) = a_o + a_1 \cdot \Delta t = 57{,}75 + 4 \cdot 2 = 65{,}75$;

V.

$\bar{X}(t+\Delta t) = a_o + a_1 \cdot \Delta t + a_2 \cdot (\Delta t^2/2)$;

$$\begin{cases} a_o = 3 \cdot (\bar{X}_4^{(1)}(t) - \bar{X}_4^{(2)}(t)) + \bar{X}_4^{(3)}(t); \\ a_1 = \alpha/(2 \cdot (1-\alpha)^2) \cdot ((6-5\alpha) \cdot \bar{X}_4^{(1)}(t) - 2 \cdot (5-4\alpha) \cdot \bar{X}_4^{(2)}(t) + (4-3\alpha) \cdot \bar{X}_4^{(3)}(t)); \\ a_2 = \alpha/((1-\alpha)^2) \cdot (\bar{X}_4^{(1)}(t) - 2\bar{X}_4^{(2)}(t) + \bar{X}_4^{(3)}(t)); \end{cases}$$

$a_o = 3 \cdot (\bar{X}_4^{(1)}(t) - \bar{X}_4^{(2)}(t)) + \bar{X}_4^{(3)}(t) = 3 \cdot (57{,}5 - 57{,}25) + 53{,}63 = 0{,}75 + 53{,}63 = 54{,}38$;

$a_1 = \alpha/(2 \cdot (1-\alpha)^2) \cdot ((6-5\alpha) \cdot \bar{X}_4^{(1)}(t) - 2 \cdot (5-4\alpha) \cdot \bar{X}_4^{(2)}(t) + (4-3\alpha) \cdot \bar{X}_4^{(3)}(t)) =$

$= 0{,}5/(2 \cdot (1-0{,}5)^2) \cdot ((6-5 \cdot 0{,}5) \cdot 57{,}5 - 2 \cdot (5-4 \cdot 0{,}5) \cdot 57{,}25 + (4-3 \cdot 0{,}5) \cdot 53{,}63) =$

$= 0{,}5/(0{,}5) \cdot (3{,}5 \cdot 57{,}5 - 6 \cdot 57{,}25 + 2{,}5 \cdot 53{,}63) = 1/(201{,}25 - 343{,}5 + 134{,}08) =$

$= 1/(-8{,}17) = -0{,}12$;

$a_2 = \alpha/((1-\alpha)^2) \cdot \left(\bar{X}_4^{(1)}(t) - 2\bar{X}_4^{(2)}(t) + \bar{X}_4^{(3)}(t)\right) =$

$= 0{,}5/(1-0{,}5)^2 \cdot (57{,}5 - 2 \cdot 57{,}25 + 53{,}63) = 1/0{,}5 \cdot (111{,}13 - 114{,}5) = 1/(-1{,}685) = -0{,}59$;

$\Delta t = 1$; $\bar{X}(t+\Delta t) = a_o + a_1 \cdot \Delta t + a_2 \cdot (\Delta t^2/2) = 54{,}38 + (-0{,}12) \cdot 1 + (-0{,}59) \cdot 0{,}5 = 54{,}38 - 0{,}415 = 53{,}97$;

$\Delta t = 2$; $\bar{X}(t+\Delta t) = a_o + a_1 \cdot \Delta t + a_2 \cdot (\Delta t^2/2) = 54{,}38 + (-0{,}12) \cdot 2 + (-0{,}59) \cdot 2 = 54{,}38 - 1{,}42 = 52{,}96$;

II. Number of pharmaceutical enterprises with GMP certification (in percent), Xi(t).

Target indicators of the effectiveness of the implementation of the concept of development of the pharmaceutical network of the Republic of Uzbekistan in 2019 — 20243-jadval

N	INDICATORS \ YEARS	2019 y.	2020 y.	2021 y.	2022 y.	2023 y.	2024 y.
1.	The number of pharmaceutical enterprises with GMP certification (in percent). Xi (t)	9	40	70	100	100	100
2.	$\bar{X}_i^{(1)}(t)$	9	24,5	55	85	100,07	100,13
3.	$\bar{X}_i^{(2)}(t)$	9	16,75	39,75	70,00	91,61	66,68
4.	$\bar{X}_i^{(3)}(t)$	9	23,53	48,25	77,5		

III. Number of pharmaceutical enterprises, Xi (t).

Target indicators of the effectiveness of the implementation of the concept of development of the pharmaceutical network of the Republic of Uzbekistan in 2019 — 20244-jadval

N	INDICATORS \ YEARS	2019 y.	2020 y.	2021 y.	2022 y.	2023 y.	2024 y.
1.	Number of pharmaceutical enterprises. $X_i(t)$	191	196	203	209	215	220
2.	$\bar{X}_i^{(1)}(t)$	191	193,5	199,5	206	209,56	209,87
3.	$\bar{X}_i^{(2)}(t)$	191	192,25	196,5	202,75	217,35	240,72
4.	$\bar{X}_i^{(3)}(t)$	191	191,63	194,38	199,63		

IV. Volume of export of pharmaceutical products (mln. Us doll.), $X_i(t)$.

Target indicators of the effectiveness of the implementation of the concept of development of the pharmaceutical network of the Republic of Uzbekistan in 2019 — 20245-jadval

N	INDICATORS \ YEARS	2019 y.	2020	2021	2022	2023	2024
1.	Volume of export of pharmaceutical ucts (mln. Us doll.),$X_i(t)$.	28	35	40	55	70	85
2.	$\bar{X}_i^{(1)}(t)$	28	31,5	37,5	47,5	52,7	52,9
3.	$\bar{X}_i^{(2)}(t)$	28	29,75	34,5	42,5	50,4	48,23
4.	$\bar{X}_i^{(3)}(t)$	28	28,88	32,13	36,13		

1. According to the analyzes, the volume of production of domestic drug forms between 2019 and 2022 has a tendency to horny linear development. During these years, the change in the total volume of production of drug forms occurred both in the plan and as a result of the analysis in the ortach (4-5) percentage range.

The change in the volumes of production of domestic drug forms was born in the forecast for 2023 and 2024 and in the analysis to the percentage range of urtach (4-5).

2. According to the analyzes, the change in the number of pharmaceutical enterprises with GMP certification between 2019 and 2022 has a linear development trend. During these years, the change in the number of pharmaceutical enterprises

with GMP certificates was born both in the plan and as a result of the analysis to the percentage range of urtach (30-31).

The change in the number of pharmaceutical enterprises with GMP certification is urtach (1-15) percent in the forecast and analysis for 2023 and 2024 there came to the range of the birth. The size of the urtach difference in the analysis with the forecast is 100% of the indicator in 2022.

3. According to the analyzes, the change in the number of pharmaceutical enterprises between 2019 and 2022 has a linear quadratic development trend. During these years, the change in the number of pharmaceutical enterprises was born both in the plan and as a result of the analysis in the ortach (5-7) percentage range.

The change in the number of pharmaceutical enterprises was born in the forecast and analysis for 2023 and 2024 to the percentage range of urtach (5-23). The magnitude of the urtach difference in the analysis with the forecast is that the change in the indicator in 2019 and 2024 is found in linear quadratic.

4. According to the analyzes, the volume of exports of pharmaceutical products between 2019 and 2022 has a linear development trend. The change in the total volume of production of drug forms during these years is due to the amount range of ortach (5-15), both in the plan and as a result of the analysis

Conclusions and suggestions.

1. At the end of the last five years, 10 of the 95 domestic pharmaceutical enterprises producing medicines have introduced the requirements of the "necessary production practice" — GMP. Analysis shows that the change in the number of pharmaceutical enterprises with GMP certification between 2019 and 2022 increased in quantity to a value of 100% in 2023, 2024, having a linear development trend. Therefore, the urtach value in the analysis with the forecast was 100% found in 2023, 2024.

2. The analysis shows that the target indicators of the effectiveness of the implementation of the concept of development of the Barch pharmaceutical network, which remained between 2019 and 2022, change in the yield with the forecast, having a linear and linear quadratic trend of development with ortach value in the analysis close to each other in 2023, 2024.

3. In particular, the types of products from which the pharmaceutical industry is released

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