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ECONOMIC AND STATISTICAL METHODS OF ESTIMATING AND FORECASTING THE ENTERPRISE PRODUCTION ACTIVITY AND REALIZATION OF OILSEED CROPS

Abstract

Enhancing food security of Kazakhstan, increasing food products is one of the priority tasks of the country's economic policy. The processing industry is one of the most important links of the agro-industrial complex as a whole, being an integral part of the country's food security. The processing industry provides the population with quality food products, income from the sale of products, as well as jobs. Therefore, it is necessary to pay special attention to its qualitative development and efficiency improvement by means of economic and statistical methods of evaluation and forecasting of enterprise activity. The research was performed at the micro level in the districts of Kostanay region. A number of typical farms of the region engaged in production of grain legumes and oilseed crops, processing of oilseed crops and sale of finished products were involved. The article considers economic and statistical methods of estimating the change in cash flows from the sale of oilseed linen, as well as forecasting the transformation of sales revenue up to 2026. The work presents several new aspects of the study, including adaptation to government subsidies and market demand, characterisation of the life cycle stage of the company, application of statistical analysis, and a detailed economic sense and methodological calculation of the company's financial health. The following research methods were applied in the article: statistical method of dynamic series, interval level of the series of dynamics of cash receipts, absolute growth at prices and base values, considered the impact of unaccounted factors, growth and acceleration rates by chain and base method. As a result, the data of the study showed the instability of changes in cash from the sale of oilseed linen.

Key words: economic and statistical methods, production, agro-industrial complex, implementation, estimation, forecasting, processing industry.

Introduction

Processing of oilseed crops is a priority in the agro-industrial complex of the state, which provides the population of the country with quality food products, plant oils, making a special contribution to the food security of the country. It should be taken into account that sunflower oil is included in the List of socially important food products [1].

In the last 25 years, the world production of oilseeds has doubled due to the increase in demand for plant oils caused by such factors as increased food consumption in developing countries, industrial use of vegetable oils, dietary changes in favour of vegetable oils and the introduction of biofuels. Oilseeds are not only important for human nutrition but also crucial for animal nutrition [2].

In order to fully provide the population of the country with socially important food products, it is necessary to create specialised processing plants in district centres and monotowns according to the map of village location in accordance with the level of specialization of regions [3].

Kostanay region is an agrarian-industrial region of the republic, and the specialised industries are mining, food industry, manufacturing of automobiles, production of agricultural machinery, as well as intensive grain production and meat and dairy cattle breeding.

Materials and methods

The research was performed at the micro level in the districts of Kostanay region. A number of typical farms of the region engaged in the production of grain legumes and oilseed crops, processing of oilseed crops and sale of finished products were involved. Since the financial activity of any enterprise is a commercial secret, average data of the enterprises were used in the work.

The following research methods were applied in the article: the statistical method of dynamic series, interval level of the series of dynamics of cash receipts, absolute growth at prices and base values, the influence of unaccounted factors was taken into account, growth and growth rates by chain and base method. As a result, the data of the study showed the instability of changes in cash from the sale of oilseed linen, but there are no obvious pronounced changes and the graph can be said to determine the trend. There is no regularity and general tendency in the dynamics of the cost of sales of 1 tonne of linen. A detailed study of the cost of sales of 1 ton of linen is required, for this purpose the method of series equalisation was used. The method of calculating the moving average found the established trend of transformation of the selling price of 1 tonne of linen, there is an increase in each period commensurately. The method of moving average determined the tendency of modification of the selling price of 1 tonne of linen, which data showed a constant increase, however, in the increase is observed oscillatory changes. The next step performed analytical alignment and identified the found trend line of the formation of the selling price of 1 tonne of linen. This methodology is quite reliable, as it uses the equations of the straight line, reflecting the processes of further development of society most accurately.

Main provisions

The specialisation of the studied enterprises is focused on production of vegetable oil of high quality on the basis of German technology of cold pressing, linseed oil is produced under the brand. The enterprises are among the main companies of food industry of Kostanay region fulfils specialised orders in the republic. All manufactured products are obtained from raw materials of ecologically clean, grown on the land in the Northern region of Kazakhstan. Production is carried out under strict control of high-class specialists with the use of innovative technology and modern technical means from Germany, without using various types of chemical fertilisers. The enterprises conduct wholesale and retail trade of unrefined linseed oil, as well as products are exported. The products have a certificate and licence.

Main type of activity:

- production of grain – legumes, oil crops;
- processing of oil crops;
- processing of grain crops;
- storage of finished products;
- realisation of finished products.

Today the main large consumers of the plant are partners from China, they buy up to a thousand tonnes of oil per year from the surveyed enterprises.

In general, the growth of mutual trade between Kazakhstan and China for 2022 reached 23.6%. The active dynamics of the rise in mutual trade is mainly due to the increase in exports from Kazakhstan to China in the following direction: agricultural products – by 133.7 %, raw materials of the energy industry – 58%, chemical products – 25.2% [4].

The quality and competitiveness of agricultural products processed in production does not meet the needs of the market. These problems indicate the need to consider effective and rational ways to manage agricultural production.

Improving the efficiency of agricultural production management is very important for the agricultural sector of the country, and in the process of finding its rational ways we must determine our place in the world market [5].

Literature review

To select research methods, foreign and domestic literature for the last five years was investigated. The article by Kashtyakov Ye. [2] indicates factors affecting competitiveness in the market of oilseeds, understanding of which will facilitate strategic decision-making by industry participants. The paper by Zhenskhan D. [3] presents an analysis of the current state of development of food processing enterprises in Kazakhstan and identifies ways of its further development. The authors noted that in 2020 due to the pandemic COVID-19 prices for imported products increased. In addition, production costs in agriculture have increased. Prices for sunflower oil increased by 20%. The article by Abildayev S.T. makes a number of conclusions about how the geopolitical situation affects the global food market and the extent of its impact. The authors note that for 2019–2021, when analysing the structure of changes in exports of agricultural goods, it can be noted that the growth of demand occurred in raw materials, while the demand for finished products decreased.

Economic-statistical modelling helps to analyse complex systems and processes, find optimal solutions and predict results [6]. The article [7] uses a mathematical programming method known as data envelopment analysis, the software develops a code to decompose economic efficiency taking into account alternative definitions: profit, profitability, cost and revenue. In article [8] This work aims to systematically apply an updated review to critically assess the agricultural research articles' contributions among the assessment of those methods, models or tools, as well as a quantitative and qualitative in-depth analysis review to classify them, according to their mapping, functions, strengths, weaknesses, and logical relationships for the evaluation in the crop agricultural sector.

The authors explored the experience of foreign countries in the organisation of the processing industry, which are engaged in the production of oilseed crops [9], the benefits of flax for human health [10, 11]. Producers of flax products need to know how profitable this crop is, and how the crop can behave when organisms or populations of the same species influence each other; what is the interaction of individuals or populations of different species, etc. [12].

The author Zhailaubayeva Sh.D. [13] analysed the oilseed production and oil-fat industry for the last 5 years, which are located in the territory of East Kazakhstan region. The authors proposed conclusions that are applicable to the enterprises of Kostanay region, namely: the need for a set of measures to stabilise the market of oilseeds and processed products, providing the agricultural sector with state support in the form of subsidies and loans without collateral at low interest rates.

When studying the domestic literature, the sources can be divided into two groups: scientific works on the study and analysis of the agro-industrial complex, in particular, the processing industry [14, 15]. The second group is represented by works devoted to the methods of evaluation and forecasting of the enterprise [16, 17].

The work also used official information posted on the website of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

Results and discussion

Agriculture is significantly dependent on natural and climatic conditions, especially in the zone of sharply continental climate of Kazakhstan. Since raw materials for the processing industry are products of agriculture, the enterprises are also always in search of solutions to their problems related to risky farming. From 2019–2020, due to dry summers and low yields, there was a shortage of demand and output to the world market. This problem coincided with the COVID-19 pandemic, which intensified a number of problems, such as transporting produce to railway stations at the border, related to the tightening of quarantine measures and limiting the importation of produce from Kazakhstan.

Processing enterprises work in harsh conditions, testing themselves for strength. But then the issues of subsidies for the production of oilseeds began to be resolved at the state level. Domestic enterprises will sell their products to local processing plants receiving a subsidy from the state,

which will affect the stabilization of the cost. It was exactly during this period that the plant promptly decided to temporarily retrain to the production of sunflower oil, which is in great demand among the population, in order to somehow stay afloat.

The plant of has been on the market of oilseed crops not so long ago, but has already achieved concrete results in the competition for the production of oilseed products. If we consider the stages of the life cycle, then we can characterize it as a stage of formation. The company is characterized by constant solutions to problems.

Disadvantages still exist at the company. These are the departments of elaboration a planned strategy for the development of the enterprise for short and long-term periods, the overload of the management staff, the increased dependence of the results of the company's activities on the professionalism of own and business qualities of the top management.

Let's consider the cash proceeds from the sale of enterprise in dynamics based on accounting data using the statistical method of a time series (table 1).

The analysis should begin with the search for an indicator of the average value of the sold products, and we use a number of other analytical values.

Table 1 – Indicators of cash proceeds from the sale of oilseed crops in enterprise for the period from 2017 to 2022

	2017	2018	2019	2020	2021	2022
Name	Y1	Y2	Y3	Y4	Y5	Y6
Revenue from the sale of oilseed linen, thousand tenge	5716,38	15616,1	13746,8	16974,2	27207,95	53441,3
The amount of oilseed linen sold, tons	101,500	163,000	168,000	174,000	185,000	242,000
The selling price of 1 ton of oilseed crops, tenge	56319	95804	81826	97553	147070	220832
Note: Compiled by authors based on the source [18].						

The application of the method of statistical analysis of the time series will allow us to determine the following indicators of cash proceeds in Kostanay region: the average growth rate, the absolute increase, the growth rate, the increase rate, the absolute value of 1% increase and the average absolute increase.

Let's consider the interval levels of the time series of cash proceeds and the amount of linen oilseed crop sold, designated (Y1, Y2, Y3... Yn), which are located in time and are comparable to each other. The individual level Y describes a variety of processes occurring in the life of society over a certain period of time, however, there is often a need to determine the volume of the process under study as a whole over a certain period of time. Formula for calculating the average level of the time series of (1):

$$\bar{Y} = \frac{Y_1 + Y_2 + Y_3 + \ldots + Y_n}{n}, \quad (1)$$

where $\bar{Y}$ is the level of dynamics of cash proceeds on average, thousand tenge;

$Y_1, Y_2, Y_3, \ldots Y_n$ – cash proceeds for the sale of linen, thousand tenge;

n – the number of units of time of the studied interval.

Thus, during the study period, the average cash proceeds from the sale of linen amounted to 22,117,119 thousand tenge.

$$\bar{Y} = \frac{5716{,}38 + 15616{,}05 + 13746{,}77 + 16974{,}22 + 27207{,}95 + 53441{,}34}{6} = \frac{132702{,}71}{6} = 22117{,}12$$

Thus, on average for 6 years, the value of cash proceeds amounted to 22,117.12 thousand tenge.

Next, using the data in Table 1, we will consider the economic sense, and the methodical calculation of these values. These levels of cash proceeds series from 2017 to 2022, indicated by the

following type Y1-2017, Y2-2018, Y1-2019, Y2-2020, Y1-2021, Y2-2022 are observed. To identify the dynamics of revenue (table 2).

During the study period, the average amount of oilseed linen sold amounted to 172250 thousand tenge.

$$\overline{Y} = \frac{101500 + 163000 + 168000 + 174000 + 185000 + 242000}{6} = \frac{1033500}{6} = 172250$$

Table 2 – Analysis of cash proceeds dynamics for the period from 2017–2022 enterprise

Name	2017	2018	2019	2020	2021	2022
Cash proceeds for the sale of oilseed linen, thousand tenge	5716,4	15616,1	13746,8	16974,2	27207,95	53441,34
The amount of oilseed linen sold, tons	101500	163000	168000	174000	185000	242000
The selling price of 1 ton of oilseed crops, tenge	56319	95804	81826	97553	147070	220832
Absolute increase in cash proceeds, (chain) thousand tenge		9899,67	-1869,28	3227,45	10233,73	26233,39
Absolute increase in cash proceeds, (basic) thousand tenge		9899,67	8030,39	11257,84	21491,57	47724,97
Cash proceeds growth rate, (chain) %		273,181	88,030	123,478	160,290	196,418
Cash proceeds growth rate, (basic) %		273,181	240,480	296,940	475,965	934,881
Cash proceeds increase rate, (chain) %		173,181	-11,970	23,478	60,290	96,418
Cash proceeds increase rate, (basic) %		173,181	140,480	196,940	375,965	834,881
Absolute increase in the sold oilseed linen, (chain) tons		61500	5000	6000	11000	57000
Absolute increase in the sold oilseed linen, (basic) tons		61500	66500	72500	83500	140500
Growth rate of oilseed linen sold, (chain) %		160,591	103,067	103,571	106,322	130,811
Growth rate of oilseed linen sold, (basic) %		160,591	165,517	171,429	182,266	238,424
Increase rate of oilseed linen sold, (chain) %		60,591	3,067	3,571	6,322	30,811
Increase rate of oilseed linen sold, (basic) %		60,591	65,517	71,429	82,266	138,424
1% of the absolute increase in cash proceeds		57,16	156,16	137,47	169,74	272,08
1% of the absolute increase, the amount of linen sold		1015	1630	1680	1740	1850
Note: Compiled by authors based on the source [18].						

According to table 2, the calculated values of the absolute increase in chain and basic values are shown, this indicator determines in absolute terms, by what number of units the value under study has decreased or increased, formula 2.

$$\text{By chain} - \Delta_{20NN2.} = Y_n - Y_{n-1}, \text{ by basic} - \Delta_{20NN2.} = Y_n - Y_1 \quad (2)$$

The results of the absolute increase values by the chain method, where the comparison is the next year to the previous one, change significantly and it is impossible to determine what the trend of the company's revenue is (figure 1, p. 192).

Next, let's look at the calculation of the absolute increase according to the basic method, when the difference of each subsequent one with the beginning or base of comparison is found.

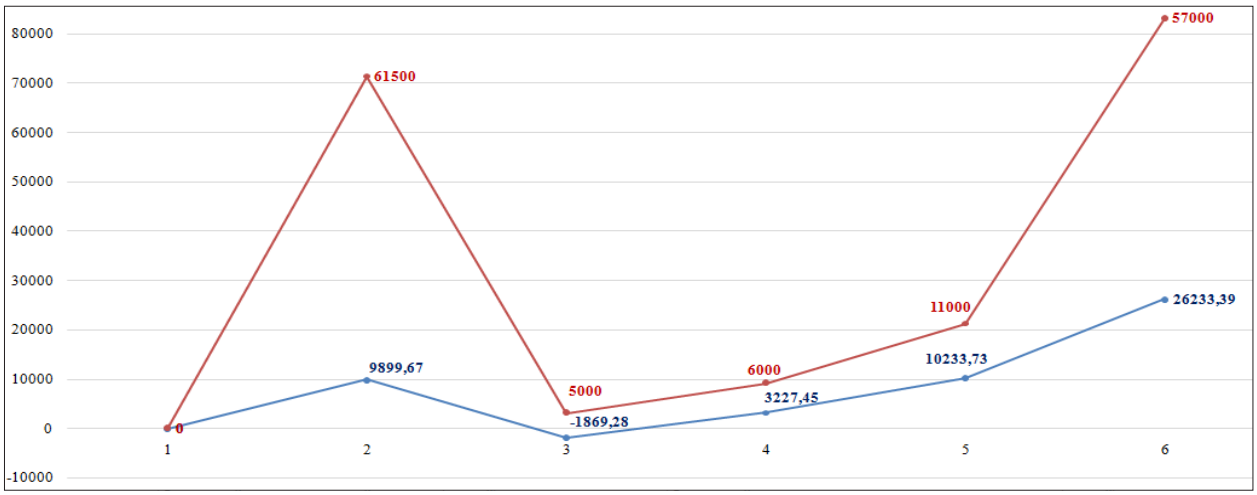

Figure 1 – Cash proceeds from the sale of linen in dynamics f
rom 2017–2022 in enterprise, thousand tenge

Note: Compiled by authors based on the source [18].

Thus, undoubtedly, we see a trend of growth in cash proceeds from the sale of the linen oilseed crop in the enterprise under study, the overall picture is positive in comparison with the base period of 2017. However, this method does not specify, quite accurately, the dynamics of the stability of the cash proceeds from the sale of the company, so it is necessary to consider the impact of other factors that have not been taken into account.

We will conduct an analysis of social phenomena, which determines the key role in the study of growth and increase rates indicators. We will calculate this value by chain and basic methods.

The calculated values have a positive dynamics, but there is no identified trend, the values have significant differences among themselves from year to year, for example, in 2018 – 273.18%, and in 2019 – 88.03%. In this case, it is necessary to use more accurate research methods in order to identify the pattern of cash flow.

The basic method is calculated as the ratio of each subsequent level of the series to the comparison base, and multiplied by 100%. Calculations show that before 2018, the indicators decreased and by 2019 began to gain growth, the analysis of dynamics also revealed no changes in cash from sales.

The following indicator, the increase rate, is calculated as the difference between the growth rate and 100% in two ways, basic and chain, and represents how much % the value under study has decreased or increased.

Let's consider the final indicator, which serves as an indirect measurement of the basic level of the absolute value of 1% increase. This value is calculated only by the chain method and determines one hundredth of the basic level, and also acts as the ratio of absolute increase to the corresponding increase rate in %. The formula for the calculation is presented (3).

$$1\%\Delta Y = \frac{\Delta Y}{\Delta T} \Rightarrow \qquad 1\%\Delta Y = \frac{\Delta Y_{n-1}}{100\%} \tag{3}$$

where 1% ΔY is the absolute value of 1% increase;

ΔY – absolute level increase;

ΔY_{n-1} – absolute increase of the previous level;

DT – increase rate in %.

Thus, the calculations show that the absolute value of a 1% decrease or increase is 0.01 of the previous level.

The considered values of indicators in a chain method in a time series demonstrate that in dynamics the cash received from the sale of oilseed linen is unstable. This is traced by a rather sharp decrease in cash in 2019 to the amount of 1869.28 thousand tenge, and in 2020 the indicator has an increase to 3227.45 thousand tenge, then in 2021 a fairly large increase to 10233.73 thousand tenge, in 2022 also a significant increase to 26233.39 thousand tenge.

As for the study of the absolute increase in the basic method, there is also an unstable nature of the dynamics of cash from the sale of linen. In 2019, it decreased to 8030.39 thousand tenge compared to 2018, and the indicators of subsequent years in 2020, 2021 and 2022 show a growth. Of special interest is the indicator, the absolute value of 1% increase.

To prove the described conclusions, we will graphically show in the form of a linear graph the dynamics of the cash proceeds of enterprise, thousand tenge (figure 2).

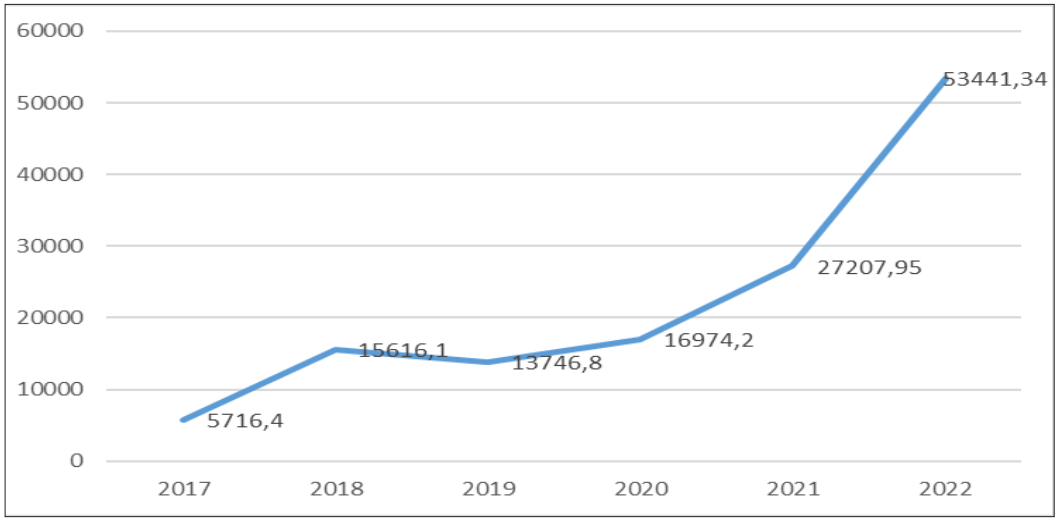

Figure 2 – Dynamics of cash proceeds in enterprise, thousand tenge

Note: Compiled by authors based on the source [18].

In 2018, the indicator of the absolute value of 1% increase is traced by a decrease of 57.16 thousand tenge of cash from sales. In 2019, we observe a growth in the indicator by 156.16 thousand tenge and in 2020 a decrease by 137.47 thousand tenge, and the next two years positive shifts by 169.74 thousand tenge and 272.08 thousand tenge, respectively, by year.

Thus, in 2018, the growth of cash from sales by 1% means an increase of 57.16 thousand tenge, then in 2021 this increase amounted to 272.08 thousand tenge. All this indicates the instability of the change in cash from the sale of linen, but there are no pronounced changes and the graph can be said to determine the trend.

Let's turn to the consideration of generalizing indicators, such as the average absolute increase and the average growth rate, according to the data we calculate the first indicator under study by formula (4).

$$\Delta\overline{Y} = \frac{Y_k - Y_n}{n-1}, \quad (4)$$

where Y_k is the final value of the level of the time series, thousand tenge, Y_n is the initial value of the level of the time series, thousand tenge, n – the number of years studied.

$$\Delta\overline{Y} = \frac{53441{,}34 - 5716{,}38}{6-1} = \frac{47724{,}97}{5} = 9544{,}99\ тыс.тенге$$

Let's calculate the average growth rate of cash from sales according to the formula (5).

$$\overline{K} = \sqrt[n-1]{\frac{Y_k}{Y_n}} \quad (5)$$

where $\overline{K}$ is the average growth rate of cash from sales, thousand tenge; Y_k - the final value of the level of a time series, thousand tenge; Y_n – the initial value of the level of a time series, thousand tenge.

$$\overline{K} = \sqrt[5]{\frac{53441,34}{5716,38}} = \sqrt[5]{9,35} = 1,5637 \text{ } или \text{ } 156,37\%$$

Thus, cash proceeds at the enterprise increased by 156.37% every year, which is a positive thing. With the help of calculated values it is impossible to determine a pattern of decrease or increase in cash proceeds from sales (in our situation of increase).

Let's consider the content of qualitative values, which are established by the following factors of a natural and economic origin, as a result, the analysis of the dynamics of these values is considered for a long time. In this situation, the time interval should be at least 9 years (from 2014 to 2022).

Indicators of the growth rate of the sale price of 1 ton of linen will be considered in two ways: basic and chain. The obtained data will be placed in table 3.

Table 3 – Growth rates of the sale price of 1 ton of linen from 2014 to 2022 for the calculation of enterprise

Years	The sale price for 1 ton of oilseed crops (linen), tenge	Growth rates, % by chain	Growth rate, % by basis
2014	41787	-	-
2015	44435	106,34	106,34
2016	46552	104,76	111,40
2017	56319	120,98	134,78
2018	95804	170,11	229,27
2019	81826	85,41	195,82
2020	97553	119,22	233,45
2021	147070	150,76	351,95
2022	220832	150,15	528,47
Note: Compiled by authors based on the source [18].			

The calculated chain values of the indicators of the growth in the cost of selling 1 ton of oilseed linen indicate an unstable trend of cost development. A sharp increase in the cost occurs in 2018 (95,804 tenge), the chain growth rate was 170.11%, and in 2019 the indicator decreases to the amount of 81,826 tenge, the growth rate is 85.41%, it is below 100%. During this period of time from 2014 to 2022, there is an uneven growth rate, there is no development trend.

In comparison with the baseline (2014), the dynamics of the cost of selling 1 ton of oilseed linen is presented positively. Observation says that the growth rate for the study period is more than 100%, although there were small jumps in 2019. In 2017, the growth rate was 134.78%, and in 2018 it was already 229.27%, we see a sharp jump to increase; and from 2017 to 2020, we also see abrupt movements in growth rates – 195,82%, 223,45%, 351,95%, 528,47% respectively by year. In the reporting year, compared with the base year, we note a good growth of almost 5.3 times, which is relatively high growth rates of the sale price of 1 ton of linen.

Summing up, we note that there is no pattern and general trend in the dynamics of the cost of selling 1 ton of linen. A more detailed study of the sale cost of 1 ton of linen is required, for this we will align the row.

The method of calculating the moving average revealed the established trend of transformation of the sale price of 1 ton of linen, there is an increase in each period proportionally. But it's still worth considering other methods of price research in dynamics. The calculations made are shown in table 4 (p. 195).

Considering the calculated indicators of table 4, it should be noted that there is the established trends in the transformation of the sale price of 1 ton of linen in enterprise in merging periods and moving average columns for the period from 2014 to 2022. There is a steady proportional increase in the sale price for the period under study. The moving average method has determined the trend of modification of the sale price of 1 ton of linen; we see a constant increase, however, there are

fluctuating changes in the increase. The next step is to perform an analytical alignment and identify the trend line found of the formation of the sale price of 1 ton of linen. This technique is quite reliable, the equations of the straight line are used here, it reflects the processes of further development of society most accurately.

Table 4 – Identification of trends in the change in the price of linen sales of enterprise, tenge

Years	Merging periods		Moving average	
	Amount for 3 years, tenge	Average sale price of 1 ton of linen for 3 years, tenge	Amount for 3 years, tenge	Average sale price of 1 ton for 3 years, tenge
2014	132774	44258	-	-
2015			132774	44258
2016			147306	49102
2017	233949	77983	198675	66225
2018			233949	77983
2019			275183	91727,7
2020	833357	277786	326449	108816,3
2021			465455	155151,7
2022			-	-
Note: Compiled by authors based on the source [18].				

The dynamics of studying the sale price of 1 ton of linen will be depicted by a graph (figure 3):

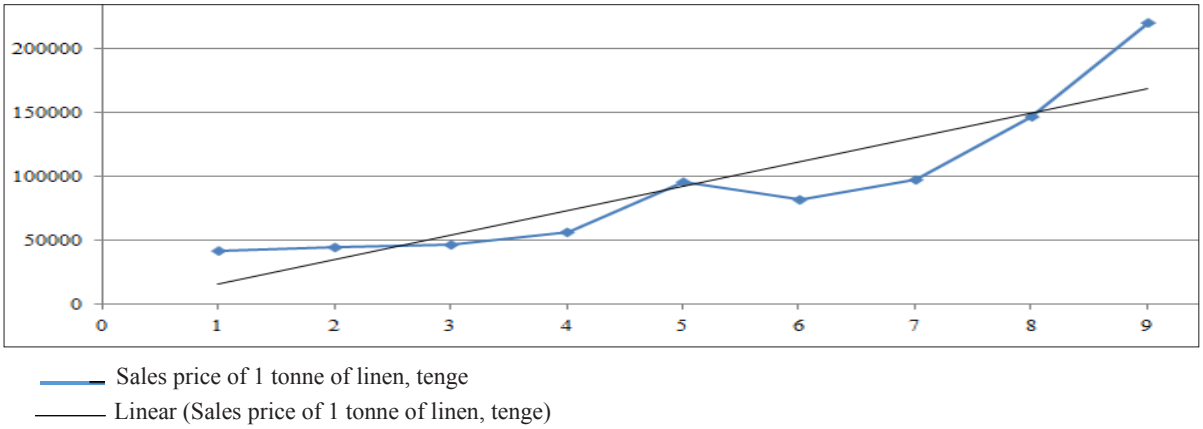

Figure 3 – Analytical alignment of the dynamics of the sale price of 1 ton of linen enterprise, tenge

Note: Compiled by authors based on the source [18].

The analyzed statistical methods for detecting the general orientation of the modification of the time series do not provide an image of a smooth trend formation line in this series. The use of analytical alignment, which consists in finding an equation showing the pattern of changes in processes as y = f (t) – a function in time. This is the type of equation that establishes the peculiarities of the development of a certain process in dynamics. The logic of the analysis is the selectivity of the equation type and it will be based on the calculations of the dynamics indicators performed.

Assuming that in the conditional sample the absolute increases in the sale price of 1 ton of linen are relatively stable, now we will perform the analytical alignment of a time series along a straight line, and use the analytical equation of the following type:

$$Y_t = a_0 + a_1 \times t, \quad (6)$$

where: Y_t equalization of the sum of the price every year, tenge,
t – the convention of marking stages of time,
a_0, a_1 – unknown parameter values.

Let's simplify the search for equation parameters. To do this, we can count the t-time so that the sum of the time value of the studied time series is equal to (t = 0). Here it is necessary to note an odd number of levels of the time series and the level coming to the middle of the series is denoted as zero 0. Then the time level above will be indicated with negative signs, for example (-1, -2, -3,...), and standing numbers with a positive sign (+1, +2, +3, ...). The initial and calculated indicators for the operation of the system are given in table 5.

Table 5 – Initial data for solving the system of equations

Years	The sale price of 1 ton of linen, Y	t	t^2	Yt	Y_t
2014	41787	-4	16	-167148	15691,29
2015	44435	-3	9	-133305	34884,52
2016	46552	-2	4	-93104	54077,76
2017	56319	-1	1	-56319	73270,99
2018	95804	0	0	0	92464,22
2019	81826	1	1	81826	111657,46
2020	97553	2	4	195106	130850,69
2021	147070	3	9	441210	150043,92
2022	220832	4	16	883328	169237,16
$\sum = 9$	$\sum = 832178$	$\sum = 0$	$\sum = 60$	$\sum = 1151594$	$\sum = 832178$
Note: Compiled by authors based on the source [18].					

The parameters of the equation system are calculated using the least squares (OLS) method and we make a model of the line expressed by the equation:

$$Y_t = 92464, 22 + 19193, 23*t$$

Thus, parameter a 1 represents the annual increase or decrease in the process under study, in our example is the sale cost of 1 ton of linen, tenge. Approximately, every year during the studied period of time, the average sale price of 1 ton of linen increased by 19193.23 tenge.

Substituting the value "t" into the compiled model, we can set the annual estimated revenue values:

$$Y_t = 92464, 22 + 19193, 23*t$$

Therefore, we get the alignment of the linen sale price series, which confirmed by a systematic increase in this indicator in annual revenue increment. The obtained theoretical values of the sales prices are presented in the form of a graph, an aligned outline Y t is created (figure 4). From the presented theoretical and forecast graph, it can be noted that there is a positive trend in the dynamics of linen sales prices at the company.

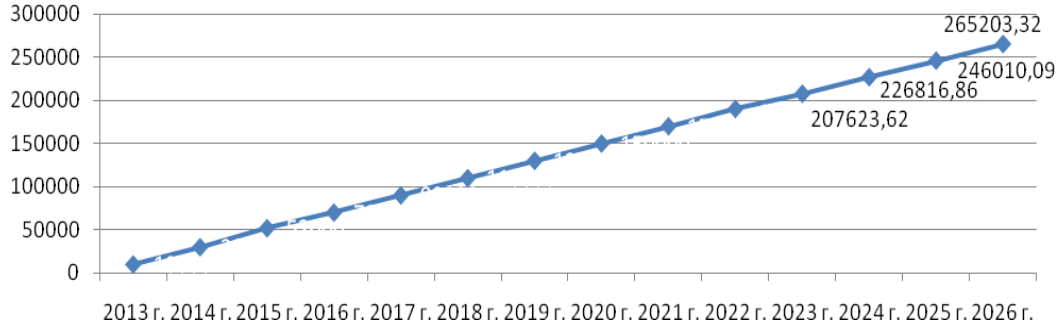

Figure 4 – Theoretical and forecast values of the linen sale price of enterprise LLP, tenge

Note: Compiled by authors based on the source [18].

Keeping the trend shown, we can make a forecast of the transformation of sales revenue until 2026, tenge.

Conclusion

Summing up, it is worth noting that the sale price of 1 ton of linen is steadily increasing and makes linen production more profitable for the company. For a complete study of the effective activity of the company, it is necessary to study the reserve structure of increasing production inside and revenue from the sale of linen. For these purposes, special software products are needed to work with large arrays of numbers, where not only a linear function will be considered, but other types of functions, such as parabolic, power, exponential, logarithmic.

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МАЙЛЫ ДАҚЫЛДАРДЫ ӨНДІРУШІ ЖӘНЕ ЖҮЗЕГЕ АСЫРУШЫ КӘСІПОРЫННЫҢ ҚЫЗМЕТІН БАҒАЛАУДЫҢ ЖӘНЕ БОЛЖАУДЫҢ ЭКОНОМИКАЛЫҚ ЖӘНЕ СТАТИСТИКАЛЫҚ ӘДІСТЕРІ

Аңдатпа

Қазақстанның азық-түлік қауіпсіздігін нығайту және азық-түлік өнімдерін көбейту еліміздің экономикалық саясатының басым бағыттарының бірі болып табылады. Өңдеу өнеркәсібі елдің азық-түлік қауіпсіздігінің құрамдас бөлігі бола отырып, жалпы агроөнеркәсіп кешенінің маңызды бөліктерінің бірі болып табылады. Өңдеу өнеркәсібі халықты сапалы азық-түлік өнімдерімен қамтамасыз етіп, жұмыспен қамтамасыз етіп, өнімді өткізуден түсетін кірісті қамтамасыз етеді. Демек, кәсіпорынның қызметін бағалау мен болжаудың экономикалық-статистикалық әдістері арқылы оның сапалы дамуына және тиімділігін арттыруға ерекше назар аудару қажет. Зерттеу Қостанай облысының аудандарында микродеңгейде жүргізілді. Бұған облыстағы дәнді бұршақ және майлы дақылдар өндірумен, майлы дақылдарды өңдеумен және дайын өнімді өткізумен айналысатын бірқатар типтік шаруашылықтар тартылды. Мақалада майлы зығыр дақылын сатудан түскен қаражаттың өзгеруін бағалаудың экономикалық-статистикалық әдістері, сондай-ақ сатудан түскен кірістің 2026 жылға дейін өзгеруін болжау қарастырылады. Жұмыста зерттеудің бірнеше жаңа аспектілері, соның ішінде мемлекеттік субсидияларға және нарықтық сұранысқа бейімделу, компанияның өмірлік циклінің кезеңінің сипаттамасы, статистикалық талдауды қолдану және егжей-тегжейлі экономикалық салдарлар мен компанияның қаржылық жағдайының әдістемелік есебі қарастырылған. Мақалада келесі зерттеу әдістері қолданылды: динамикалық сериялардың статистикалық әдісі, ақша түсімдерінің динамикасының аралық деңгейі, бағалар мен базалық шамалар бойынша абсолютті өсім, есепке алынбаған факторлардың әсері, өсу мен өсу қарқыны тізбекті және негізді түрде қарастырылды. Нәтижесінде, бұл зерттеулер майлы зығыр дақылын сатудан түскен ақша қаражаттарының өзгеруінің тұрақсыздығын көрсетті.

Тірек сөздер: экономикалық-статистикалық әдістер, өндіріс, агроөнеркәсіптік кешен, іске асыру, бағалау, болжау, өңдеу саласы.

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ЭКОНОМИКО-СТАТИСТИЧЕСКИЕ МЕТОДЫ ОЦЕНКИ И ПРОГНОЗИРОВАНИЯ ДЕЯТЕЛЬНОСТИ ПРЕДПРИЯТИЯ ПРОИЗВОДСТВА И РЕАЛИЗАЦИИ МАСЛЕНИЧНЫХ КУЛЬТУР

Аннотация

Укрепление продовольственной безопасности Казахстана, увеличение продовольственных товаров является одной из приоритетных задач экономической политики страны. Перерабатывающая отрасль является важнейшим звеном агропромышленного комплекса, являясь неотъемлемой частью продовольственной безопасности страны. Перерабатывающая отрасль обеспечивает население качественными продуктами питания, доходом от реализации продукции, а также рабочими местами. Следовательно, необходимо уделить особое внимание ее качественному развитию и повышению эффективности путем экономико-статистических методов оценки и прогнозирования деятельности предприятия. Исследование проводилось по данным районов Костанайской области. Были привлечены типичные хозяйства области, занимающиеся производством зернобобовых и масленичных культур, переработкой масленичных культур и реализацией готовой продукции. В статье рассматриваются экономико-статистические методы оценки изменения денежных средств от реализации масленичного льна, а также прогнозирование трансформации выручки от реализации до 2026 г. В работе представлено несколько новых аспектов исследования, включая адаптацию к государственным субсидиям и рыночному спросу, характеристику стадии жизненного цикла компании, применение статистического анализа, а также подробный экономический смысл и методологический расчет финансового состояния компании. Применены следующие методы исследования: статистический метод динамического ряда, интервальный уровень ряда динамики денежной выручки, абсолютный прирост по ценам и базисным величинам, рассмотрены формы воздействия неучтенных факторов, темпы роста и прироста цепным и базисным способом. Результаты исследования показали неустойчивость изменения денежных средств от реализации масленичного льна.

Ключевые слова: экономико-статистические методы, производство, агропромышленный комплекс, реализация, оценка, прогнозирование, перерабатывающая отрасль.