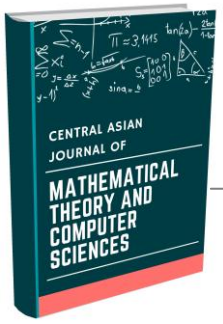

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Evaluation of the economic efficiency of the production of corrugated yarn from waste fibers

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ABSTRACT

The widespread introduction of the proposed technology will make it possible to organize the import of substitute fabrics in the republic, to provide various sectors of the national economy with high-quality, cheap products while solving the problem of utilizing indirect waste of natural and chemical fibers in the textile industry.

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INTRODUCTION

Currently, improving the quality of textile products, in particular yarns made from the same raw materials, will help to increase the export opportunities of products depending on market demand. The production of high-quality, competitive products on the world market using new, more advanced technologies is the most important task of the textile industry. The quality of textile products largely depends on the uniformity, purity and strength of the yarn. Improving the quality of textile products can be achieved through the introduction and use of modern equipment based on advanced technological principles [1,2].

THE MAIN ISSUE

The efficiency of spinning production largely depends on the rational use of raw materials, which affects the price of the finished product - yarn. It is known that when processing textile fibers, fibrous waste is formed, which is directly and indirectly separated [3]. Among them, direct waste is of great importance, as it allows you to save high-quality fiber and reduce the cost of the product produced [4,5].

Therefore, the study of the possibility of recycling fiber waste into yarn is an urgent problem, so the goal is to completely recycle the waste directly into yarn.

The method of solving the problem of saving resources is widely used in modern methods and technologies, as well as in modern organizational forms of an effective economic mechanism [6,7].

One of the most important areas of activity is the maximum use of fiber raw materials, which can be solved by creating new technologies and new generations of rotary spinning machines that allow you to combine different properties of raw materials and reinforced yarn based on the achievements of science and technology. Good

efficiency is achieved by compensating for the shortcomings of individual components or using their special properties [8].

Therefore, nylon fiber can be combined with waste cotton, natural silk, viscose, low-grade dacron. Here, the nylon covers the low strength of the natural fiber or yarn obtained from it, and the short fibers betray the mixture with the desired wave, hygroscopicity, and so on [1,3].

In this regard, we have moved to a relatively new method of implementing a reduced production technology for the production of iron fiber yarn, where 10 pieces of thick, strong, thin cotton dacron yarn are obtained as the main yarn, and its fibers are wrapped with cotton and viscose, a large amount of fiber. waste is generated. Mr. The Association.

Table 1.

The properties and physical and mechanical properties are given

№	Waste name	Linear density T-tex	Staple length, l. pcs. mm.	Breaking load, Pp. cH.	Relative. gap.nag, Roth. sn/tex
Cotton fiber waste					
1	Nuts and fluff picker	0,143	32,4	3,4	25,48
2	Card tow	0,143	30,5	3,6	26,3
3	Comb the flock	0,143	27,9	3,1	25,9
Viscose fiber waste					
1	Pooh picker	0,153	34,1	15,7	40,4
2	Propeller tow	0,153	32,4	14,1	39,2

The table shows that it is impossible to get yarn directly from low-grade raw materials. Therefore, the linear programming method was used.

As the target function of this function, you can use the gross and market value of the product, the amount of profit calculated using the full cost method. But these criteria have some problems. Therefore, in the context of market relations, the most important goal should be the benefit of the organization.

It also includes a fixed percentage of costs (depending on the specific product) that depend on the level of production of other products. If the level of production of the final product decreases, this leads to an increase in the cost of the product and, as a result, an increase in its cost and a decrease in profitability for the organization as a whole. Therefore, it is recommended to use the marginal profit index as an objective function of the modern economic and mathematical model.

Since accounting is not adapted to modern market approaches, it is necessary to identify complex and constantly changing costs. You can justify this by solving a system of linear equations that describe the following indicators for an organization: the relationship between product sales and operating costs [3].

However, the economic efficiency of an organization at a given time can be represented by the following production function model (Cobb-Douglas):

$$Y = A \cdot K^{\alpha} \cdot L^{\beta} \quad (1)$$

A - production factor, K-capital costs,

L-labor costs, α and β flexibility factors

Here α and β, the flexibility of the product in terms of capital and labor costs, respectively. The combination of these ratios is an important economic indicator and increases profits.

$\alpha+\beta=1$ we have a constant rate of profit (the cost of resources increases, the number of products increases).

At the same time, $\alpha+\beta<1$ we see a decrease in revenue (the scale of production is less than the increase in resource costs). For we have revenue growth $\alpha+\beta>1$ (production growth exceeds the cost of resources).

Therefore, taking into account the above considerations, we have developed three variants of the rope.

As the linear density of the reinforced yarn decreases, its strength increases, and the cost increases due to the large proportion of the main yarn, and the performance of the rotary yarn spinning machine decreases. However, at higher linear densities, cheaper raw materials are used to produce reinforced yarns, which reduces the cost of the technology.

After that, the cost of the main yarn and the economic efficiency of the production of reinforced yarn were determined.

Table 2.

Provides statistical data for calculating economic efficiency

Waste name	Price of yarn yarn, Sum/kg	The cost of total waste. sum / kg	Cost-effectiveness
Fiber waste	141,209	436,5	260,36
viscose	128,37182	436,5	364,8
Dacron	108,62231	436,5	444,72

Calculated by the formula: $Y = A \cdot K^{\alpha} \cdot L^{\beta}$ (1)

(1) we send the formula from both sides by logoraphymes,

$$\ln y = lnA + \alpha lnK + \beta lnL \quad (2)$$

(2) form the formula. to evaluate the coefficients A, α, β the function is structures. So

$$\varphi(A,\alpha,\beta) = \sum_{i=1}^{n}(\ln z - (\ln A + \alpha \ln k + \beta \ln L))^2 \quad (3)$$

(3) differential function (4 - system of equations), the following three unknowns are formed from the normal system of equations.

$$\begin{cases} \frac{d\varphi}{dA} = 0 \\ \frac{d\varphi}{d\alpha} = 0 \\ \frac{d\varphi}{d\beta} = 0 \end{cases} \quad (4)$$

By the condition of the differential. (4) to calculate the coefficients from condition A, α, β (5 - system of equations), we draw a system of three unknown normal equations.

$$\begin{cases} n\ln A + \alpha \sum_{i=1}^{n} \ln x_i + \beta \sum_{i=1}^{n} \ln y_i = \sum_{i=1}^{n} \ln z_i \\ \ln A \sum_{i=1}^{n} \ln x_i + \alpha \sum_{i=1}^{n} \ln^2 x + \beta \sum_{i=1}^{n} \ln x_i \ln y_i = \sum_{i=1}^{n} \ln z_i \ln x_i \\ \ln A \sum_{i=1}^{n} \ln y_i + \alpha \sum_{i=1}^{n} \ln x_i \ln y_i + \beta \sum_{i=1}^{n} (\ln y_i)^2 = \sum_{i=1}^{n} \ln z_i \ln x_i \end{cases} \quad (5)$$

(5) using the system of normal equations A, α, β we determine the unknown coefficients and make the following third table.

3 table

N	K	L	Z	ln(k)	ln(l)	ln(z)	(ln(k))^2	(ln(l))^2	ln(x(u))*ln(y(u))	ln(z(x))*ln(z(z))	ln(z(u))*ln(z(z))
1	141,21	0,4365	260,36	4,9502	-0,8289	5,5621	24,5049	0,6872	-4,10359	27,5336	-4,6108
2	128,38	0,3968	364,8	4,8550	-0,9243	5,8993	23,5708	0,8543	-4,48735	28,6412	-5,4526
3	108,62	0,3358	444,72	4,6878	-1,0913	6,0974	21,9762	1,1910	-5,11603	28,5841	-6,6543
	378,21	1,1691	1069,88	14,4931	-2,8446	17,559	70,0519	2,7324	-41,2267	254,4823	-49,9475

RESULTS ANALYSIS

According to Table 3, for fiber waste A, α, β the coefficients are determined. For waste fibers A, α, β coefficient.

$$A=4170036, \quad \alpha=-1.94379, \quad \beta=0$$

$$A=19.35592, \quad \alpha=0.6131737, \quad \beta=0.3868263$$

As shown in the table, when the linear density of the spinning rod decreases, its strength increases, and costs increase due to a large proportion of the main thread and a decrease in the productivity of the spinning machine. However, for the production of rotting threads, cheap raw materials with a high linear density are used, which reduces the cost of the technology. After that, the price of the main thread and the economic efficiency of the production of reinforced corrugated yarn were calculated according to Table 4.

Table 4.

Calculation of economic efficiency

Waste name	Price of yarn yarn, Sum/kg	The cost of total waste. sum / kg	Cost-effectiveness
Fiber waste	141,209	436,5	276,2220609
viscose	128,37182	436,5	379,9024355
Dacron	108,62231	436,5	459,9814677

Table 4 shows that, despite the low level of waste consumption and high complexity, the high cost of producing 50 textile yarns is recommended, since they are used for the production of pile fabrics.

Of course, the demand for 75 and 100 text threads can be changed, which can also be useful for reducing production costs.

Also, based on the above data, we can see graphs of changes in the square method.

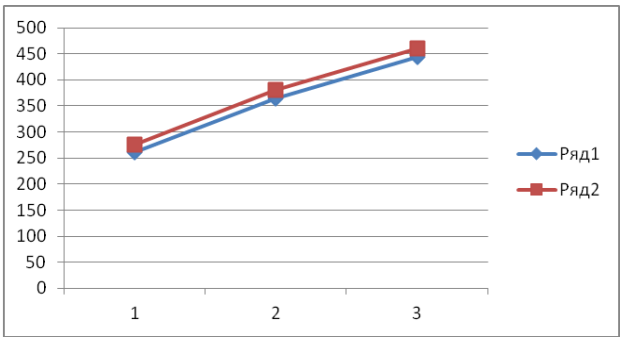

Figure 1. Row 1: the calculation Result of the first line. Row 2: The second line is the initial set values.

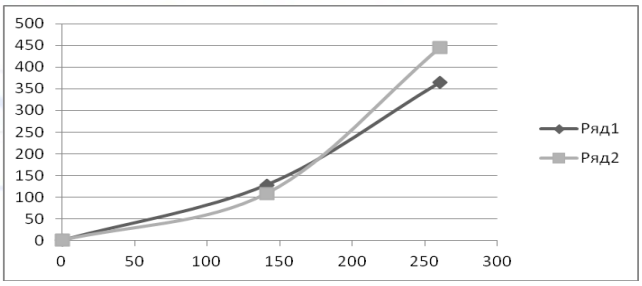

Figure 2: denoted by the square method. Row 1: the calculation Result of the first line. Row 2: Second line of initially set values

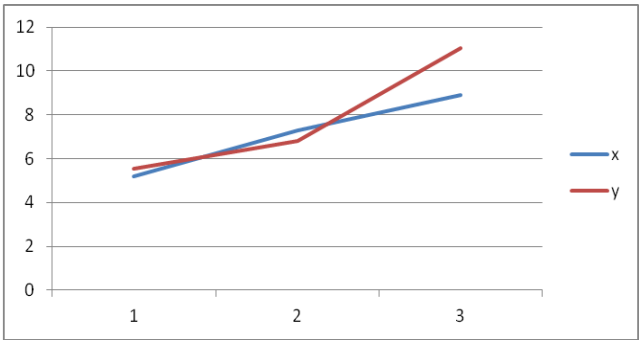

Figure 3: Shown by the square method. Row 1: The result of calculating the y-line. Row 2: X-line at the initially set values of the adjectness

CONCLUSION

In conclusion, it should be noted that in the production of yarn, yarn is imported and exported from abroad, yarn with a reinforced structure made of waste fibers, suitable for import and export, which not only achieves high economic efficiency in the production of yarn, but can also be able to earn 2-2. 4 times more net profit than in the production of yarn.

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