CALCULATION OF ANNUAL ECONOMIC EFFICIENCY OBTAINED FROM THE IMPLEMENTATION OF AN IMPROVED VARIANT OF THE BD-448 PNEUMOMECHANICAL SPINNING MACHINE SUPPLY CYLINDER DESIGN

Murodov orif jumayevich
orifakadem81@gmail.com
Panjiyev orifjon erkinovich
orifakkaunt@gmail.com
Raxmonkulov akmal oblakul o‘g‘li
akmalraxmonqulov590@gmail.com
Qurbonaliyev ahmad zufarjon o‘g‘li
p66245540@gmail.com
Gulistan State University, Gulistan city, district 4, Republic of Uzbekistan
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ABSTRACT

The article calculates and justifies the annual economic efficiency of implementing the results obtained from improving the design of the supply cylinder in 1344 spinning chambers of 3 BD-448 machines.

The economic efficiency of introducing high-performance spinning machines into production, ensuring the production of high-quality products, was calculated based on the current "Methodology for determining economic efficiency of introducing new equipment, innovations and rationalization proposals into the national economy".

Annual economic efficiency was calculated by comparing the variable costs of the basic and proposed technological options according to this methodology [1, 2, 3].

The frequency of rotation of the chambers in the BD-448 spinning machine is 100,000 min-1. In order to evaluate the role of the newly recommended supply cylinder in the spinning technology process and the results obtained in the BD-448 spinning machine, a carded yarn with a linear density of 29 tex was processed from the BD-448 pneumatic spinning machine. A wick of Bukhara-102 cotton fiber of the 4th type, 1st grade, good class was used for yarn production. The recommended feeding cylinder in this spinning machine reduces damage to the fiber roving and delivers it to the discretization zone without disturbing its smooth parallel stable movement along its width and length, as a result of which the number of yarn breaks is reduced, its quality is increased, and economic efficiency is achieved.

According to the current methodology, the economic efficiency obtained in the production

and use of a new labor tool (machine, equipment, etc.) is calculated by the following formula [4, 5, 6]:

$$Э = \left[З_1 \cdot \frac{в_2}{в_1} \cdot \frac{Р_1 + Е_н}{Р_2 + Е_н} + \frac{(И'_1 - И'_2) - Е_н(К'_2 - К'_1)}{P_2 + E_н} - З_2\right] \quad (1.1)$$

here, $З_1$, $З_2$ – The amount of costs incurred per unit of output for old and new equipment, thousand soums; $\frac{в_2}{в_1}$ - The coefficient of comparison of the efficiency of new equipment with the old one. ; $в_1$, $в_2$ – The appropriate performance of basic and new equipment; $\frac{Р_1 + Е_н}{Р_2 + Е_н}$ - coefficient for taking into account the service life of equipment compared to the baseline; P_1, P_2 – the share of the balance sheet value allocated to the complete restoration of the base and new equipment, taking into account moral obsolescence; $E_н$ – efficiency production , $E_н$=0,15; K'_1, K'_2 - the amount of consumer-directed capital investment in the base and new equipment; $И'_1, И'_2$ - annual operating costs of the consumer using the base and new equipment in the implemented option.

The cost-effectiveness of this research work is based on cash flow covering all costs associated with purchasing, transporting, installing, and operating the equipment. [7, 8, 9, 10, 11, 12, 13, 14].

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$$Э_{сиф} = (Q_1 \cdot P_1 - Q_2 \cdot P_2) \quad (1.2)$$

here, Q_1, Q_2 – base and annual production volume under the proposed option, in natural units; P_1, P_2 – price of one unit of the product according to the basis and the proposed option, soums.

In this case, the annual economic efficiency obtained from introducing new equipment into production will be equal to: [15-25]:

$$Э_{й} = Э + Э_{сиф} \quad (1.3)$$

Table 1.1 lists the information needed to perform calculations.

1.1- table

Information needed to calculate the cost effectiveness of introducing an improved version of the spinning machine feed cylinder design into production

т/р	Indicators	Unit of measurement	Options		difference
			Basis	Offered	
1.	Annual production volume	ton	5000	5323	+323
	Linear density of thread, tex	tex	29	29,4	+0.40
2.	Number of installed equipment	grain	3	3	-
3.	Number of cameras	grain	1344	1344	-
3.	Equipment performance	kg/h	82,1	98,56	+16,46
4.	The relative tensile strength of the thread	sN/tex	11,76	12,915	+11,76
5.	Number of outages in 1000 cameras for 1 hour	times	67	46	+21

6.	Depreciation Allowances for Equipment	%	15	15	-
7.	Allowance for daily recovery	%	5,0	5,0	-
8.	Delivery and assembly allowance	%	10,0	10,0	-
9	Power consumption per camera	kW	0,156	0,156	-
10	Price of consumed 1 kW/h of electricity	soum	325	325	-
9.	Amount of payment for installed capacity	soum	36800	36800	-
10.	Minimum wage set for calculations	soum	920000	920000	-
11.	Payment to social insurance	%	23	23	-
12.	Price of 1 kg of 4 type I cotton fibers The exchange rate of 1 US dollar is 11169 soums	(ш.б) сўм	2.57 28704,3	2.57 28704,3	
13.	The price of 1 kg of yarn: The exchange rate of 1 US dollar is 11169 soums	(ш.б) сўм	4,1 45792	4,3 48026	+0,2 +2234

- 1. Capital investment account
- In the basic version:
- The balance value of installed equipment is equal to:
- - The cost of VD-448 equipment corresponding to one camera 775.5 thousand soums.

Total: - 775.5 thousand soums.

- In the proposed option:
- The balance sheet value of equipment is equal to:
- - The cost of VD-448 equipment corresponding to one camera - 775,500 soums;

- Costs of scientific and technical development corresponding to one camera - 6.4 thousand soums.

Total: – 781,9 thousand soums.

2. Calculation of operating costs

Accounting works are carried out only on changed cost elements.

Depreciation allowances

In the basic version: $\frac{775,5 \cdot 15}{100} = 116,3$ t. soum

In the proposed option: $\frac{781,9 \cdot 15}{100} = 117,3$ t. soum

3. Daily maintenance costs

In the basic version:

$\frac{775,5 \cdot 5,0}{100} = 3,77$ t. soum

In the proposed option: $\frac{781,9 \cdot 5,0}{100} = 39,09$ t. soum

4. Electricity consumption is calculated as follows:

$$W = P_y \cdot K_c \cdot T_c \cdot C_э \quad (1.4)$$

here, P_y - power of installed electric motors; K_c- demand factor; T_c- equipment annual useful operating hours; $C_э$ - 1 кВт/с the cost of consumed electricity.

In the basic version:

$W = 387,69 \cdot 0,325 = 126$ t. soum

In the proposed version:

$W = 387,69 \cdot 0,325 = 126$ t. soum

5. In order to reduce damage to the fibers, the spinning machine supply cylinder consists of an outer wavy bushing and an inner bushing, and they are connected by means of a mutual rubber bushing of brand 3827 and a coefficient of uniformity of 1.5·104 Nm/rad [26-30].

32 grams for one machine, 0.07 grams for one camera, total cost of rubber is 322 soums. The total annual cost will be:

1 camera * 10 replacements * 322 = 3.22 thousand soums.

The obtained results are summarized in Table 1.2.

Table 1.2.

Estimated and operational costs based on the basic and proposed options, in thousands of soums

№	Indicators	Options	
		Basis	Basis
1	Cost of equipment until upgrade	705	705
2	Equipment transportation and installation costs	71	71
3	Correct capital expenditure	613	613
4	Costs of ITIs	-	6
5	On the creation of equipment production funds are capital deposits	613	619
6	To prepare tools and equipment quoted costs	867	868
7	Operating expenses, total including:	281	286
	- depreciation allowances	116	117
	- daily maintenance	39	39
	- edible cost of electricity	126	126
	- material consumption	-	3,22

The amount of directed capital funds is taken in the amount of 10% of the balance sheet value of the base and applied equipment:

$$K_1' = \frac{775{,}5 \cdot 10}{100} = 77{,}55\text{t. soum}$$
$$K_2' = \frac{781{,}9 \cdot 10}{100} = 78{,}19\text{ t. soum}$$

Putting the obtained data into the formula (1.3), the annual economic efficiency from the introduction of new equipment into production is calculated for one camera:

$$Э_{й} = 867 \cdot 1{,}45 \cdot 1{,}2 + \frac{(281 - 286) - 0{,}15 \cdot (78{,}19 - 77{,}55)}{0{,}164 + 0{,}15} -$$

$-868 = 624{,}35$ t. soum

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624.35 thousand soums per year for one spinning chamber, 448 624.35 = 279708.8 thousand soums for one machine, and 3 279708 8= 839126.4 thousand soums of economic benefits were calculated.

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