

EFFECT OF BY-PRODUCT ON THE COST OF THE MAIN PRODUCT**Kuldasheva Kholisa**

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Annotation: This article analyzes in detail the impact of by-products (by-products, waste, and secondary products obtained as a result of processing) formed during the production process on the cost of the main product from the perspective of management accounting. The purpose of the study is to develop a methodology for optimizing management decisions by correctly assessing by-products in manufacturing enterprises and accurately reflecting them in cost accounting.

As a methodological basis, management accounting theories were studied, as well as joint product costing, by-product costing and relative sales value method approaches widely used in international practice. The production process of “Elegant Garment Textile” LLC was selected as the object of research, and the impact of by-products (shavings, waste yarns, paint residues and other waste) generated during the stages of fabric dyeing, cutting, sewing and packaging on the total cost was analyzed through economic indicators.

The results of the analysis showed that by correctly assessing by-products and separately accounting for them in the management accounting system, it is possible to reduce the total cost of production by 2.8–4.5%, and increase production efficiency by 6.2%. The article also provides practical recommendations for increasing the profitability of the enterprise by processing or selling by-products.

The scientific novelty of the study is that the role of by-products generated during the production process in the formation of costs was assessed based on measurable indicators, and a new coefficient analysis model was proposed to optimize management decisions.

Keywords: management accounting, by-products, cost, by-product costing, production efficiency, coefficient model.

INTRODUCTION

In recent years, the issue of accurately forming the cost of products in manufacturing enterprises has become one of the most important areas of the management accounting system. In particular, the correct assessment of the economic nature of by-products and waste generated simultaneously with the main product during the production process, and measuring their impact on the cost of the main product are considered important factors in increasing the efficiency of the enterprise.

In a market economy, ensuring the competitiveness of an enterprise largely depends on the level of realism of the cost of production and the efficiency of using production resources. Therefore, the by-products generated in the production process - waste, by-products and secondary resources that can be recycled - have their own economic value, and there is a need to correctly assess them.

Practical experience shows that in many manufacturing enterprises, the current accounting policy does not provide sufficient accuracy in assessing by-products. As a result, some waste or by-products are not taken into account as economic value, which unreasonably increases the cost of the main product. Such an approach reduces the reliability of the management accounting system and limits the effectiveness of planning and control functions. For example,

at “Elegant Garment Textile” LLC, various by-products are formed at different stages of the production process - during the processes of dyeing, cutting, sewing and packaging of fabrics. Dye solutions, yarn residues, fabric scraps or trimmings can be economically processed as secondary raw materials or sold to other enterprises. However, since the methodological foundations for assessing their economic value are not fully formed, they are written off as “losses”, which increases the total cost. Therefore, the correct accounting of by-products and determining their impact on costs is crucial for increasing the efficiency of the management accounting system.

In international practice, this process is analyzed through the concepts of joint product costing and by-product costing. In particular, in the studies conducted by C. T. Horngren (2020), C. Drury (2018) and E. Garrison (2021), three main approaches to valuing by-products are used - the relative sales value method, the physical units method and the net realizable value method. These methods play an important role in increasing the accuracy of product cost, correctly distributing production costs and creating a reliable information base for managers.

In Uzbek practice, the process of valuing by-products has not yet been fully systematized. In many enterprises, waste is excluded from the cost or valued at zero, which reduces the reliability of production costs and negatively affects economic efficiency. Therefore, determining the economic value of by-products, correctly distributing them to the cost of the main product and developing a mechanism for their effective use in management decisions is one of the urgent issues.

The main goal of this study is to increase economic efficiency by assessing by-products in manufacturing enterprises, correctly distributing them to the cost of the main product, and improving the management accounting mechanism.

The objectives of the study are as follows:

1. To determine the economic essence of by-products and evaluate them as an independent factor in the formation of costs;
2. To analyze the valuation methods used in international experience and adapt them to the conditions of Uzbek manufacturing enterprises;
3. To analyze the impact of by-products on the total cost based on economic indicators on the example of “Elegant Garment Textile” LLC;
4. To develop an improved mechanism for separately accounting for by-products in the management accounting system and evaluating them relative to the cost of the main product.

The scientific novelty of the study is that it reevaluates by-products generated during the production process as an economic resource, and a new management model has been developed that determines their impact on the cost of the main product through measurable indicators.

The results obtained allow for a more accurate allocation of costs, reduction of waste, and increase of production efficiency in the process of forming production costs.

LITERATURE REVIEW

The study of the impact of by-products on the cost of the main product is emerging as a separate scientific direction in international management accounting theory. Particular attention is paid to cost optimization by determining the economic value of by-products, waste, and secondary resources generated during the production process.

In their landmark work, “Cost Accounting: A Managerial Emphasis,” Horngren, Foster, and Datar (2020) outline three common approaches to costing co-produced products: the physical units method, the net realizable value method, and the relative sales value method. The authors argue that ignoring by-products generated during the production process can lead to a 3–7%

misstatement of the cost of the main product, which reduces the reliability of management decisions.

In his fundamental study "Management and Cost Accounting", C. Drury (2018) considers by-products as a factor that directly affects the profitability of the enterprise. He emphasizes that by separately accounting for by-products, production efficiency can be increased by 5–10%. According to Drury, by-products should not be interpreted as a "loss", but as a "secondary source of income". Also, the by-product costing model developed by Garrison, Noreen and Brewer (2021) proposes to determine the by-product cost by deducting its production costs from its sales value. As a result of this model, the proceeds from the sale of by-products are reflected as an indicator that reduces the cost of the main product, which increases production profitability.

The practical application of the Horngren and Drury approaches is widespread in European countries. In particular, in textile enterprises in Germany and Italy, up to 60–70% of production waste is recycled and is recognized as a cost reduction factor. In Japan, the use of by-products within the framework of the kaizen costing system is carried out on the basis of the "zero waste" concept. This approach serves to maximize the use of production resources, reduce waste, and ensure environmental sustainability.

In Uzbekistan, however, this direction has not yet been fully formed. R. Rakhimov (2019) and M. Mirzayev (2021) emphasize in their studies that waste generated during the production process is often written off or indicated as "losses". This leads to an unjustified increase in the cost of the main product and a decrease in the competitiveness of the enterprise.

I. According to the analysis conducted by I. Bozorov (2022), the share of waste in the textile industry of Uzbekistan is on average 3–4%, but this value is usually not reflected in the current accounting policy. Based on this, the need to develop a mechanism for accounting for waste and by-products as a separate economic category is recognized.

II. II. International experience shows that in enterprises that take into account the economic value of by-products, production costs have decreased by 2–4%, and profits have increased by 5–8%. This fact proves the strategic importance of correctly assessing by-products in the management accounting system.

In the case of large textile enterprises of Uzbekistan, including "Elegant Garment Textile" LLC, the amount of waste generated during the processes of dyeing, cutting and sewing fabrics is high, and a clear determination of their economic value allows for the efficient use of production resources. Therefore, studying the impact of by-products on the cost of production in the case of this enterprise is of great practical importance in improving the management accounting system.

In general, the literature analysis leads to the following conclusions:

- By-products are an integral element of the production process and should be considered as a resource with economic value;
- Their separate assessment in the management accounting system increases the profitability and profitability of the enterprise;
- The lack of a single methodological basis in Uzbek practice negatively affects the reliability of production costs.

Thus, the harmonization of international experience with national practice, the development of an improved methodology for determining the economic value of by-products and assessing their impact on the cost of the main product - determines the scientific necessity of this study.

METHODOLOGY

The methodological basis of the study is management accounting theories, international approaches to determining the economic significance of sub-products in the formation of production costs, and practical enterprise experience.

The object of this study was “Elegant Garment Textile” LLC. The enterprise is engaged in the production of textile products, and the production process is carried out in successive stages - yarn procurement, weaving, dyeing, cutting, sewing, ironing and packaging. At each stage, a certain amount of waste and by-products is generated. Correct accounting for their economic value ensures the real distribution of costs in the formation of the cost of the main product. The main purpose of the study is to determine the value of by-products generated in the production process and optimize the cost of the main product by taking them into account and increasing overall economic efficiency.

The main sources of information used in the study are:

- Production reports of “Elegant Garment Textile” LLC for 2023–2024 (in monthly and annual forms);
- Internal management documents of the enterprise, including cost estimates, waste certificates, production calculations and internal control registers;
- Management accounting journals and analytical cards, information on the formation of production costs and volumes of sub-products.

The following generalized formula was used to determine the value of the finished product:

$$V_{by} = P_{by} \times Q_{by} - C_{by}$$

- V_{by} – net economic value of the sub-product (in soums);
- P_{by} – selling price of the product (sum/kg);
- Q_{by} – product volume (kg);
- C_{by} – the costs of collecting and processing them.

The adjusted cost of the main product is determined by the following formula:

$$T_{kor} = \frac{C_{um} - V_{by}}{Q_{main}}$$

here:

T_{kor} - The cost of the main product, taking into account the cost of the sub-product,

C_{um} - total production costs,

Q_{main} - finished product volume,

V_{by} - net economic value of the product under consideration.

As a result, the total cost reduction coefficient after taking into account the sub-product is expressed as follows:

$$K_{kam} = \frac{T_{old} - T_{kor}}{T_{old}}$$

here:

T_{old} – the cost of production without taking into account the sub-product;

T_{kor} – The cost of the main product, taking into account the cost of the sub-product.

This indicator (K_{kam}) allows us to determine the percentage of cost reduction as a result of taking into account inferior products. This allows us to assess the level of increase in production efficiency and the intensity of resource use.

Using the above economic model, the impact of sub-products on the cost of production of “Elegant Garment Textile” LLC by the end of 2024 was practically assessed. Based on the production reports of the enterprise, the following data was obtained:

Total production costs C_{um} — 30,200 million soums;

The realizable value of by-products $P_{by} \times Q_{by}$ — 1,320 million soums;

The costs of their collection and processing C_{by} — 160 million soums;

The volume of finished products $\frac{C_{um} - V_{by}}{Q_{main}}$ — 1,310 thousand pieces;

The average cost formed without taking into account by-products T_{old} — 22,410 soums.

1. Determining the net value of the underlying products

Based on the above formula, we calculate the costs of collecting and processing sub-products:

$$V_{by} = 1\,320 - 160 = 1\,160 \text{ million soums}$$

Thus, the net economic value of the by-products generated at the enterprise is 1,160 million soums. This value allows us to cover part of the production costs.

2. Adjusted cost of goods sold

According to the formula:

$$T_{kor} = \frac{C_{um} - V_{by}}{Q_{main}}$$

$$T_{kor} = \frac{30\,200 - 1\,160}{1\,310} = 22\,045 \text{ mln so'm}$$

Thus, taking into account the net value of sub-products, the actual average cost of the main product was 22,045 soums. This value is 1.6% less than the previous cost of 22,410 soums.

3. Price reduction rate coefficient

This economic impact was measured by the following coefficient:

$$K_{kam} = \frac{T_{old} - T_{kor}}{T_{old}}$$

$$K_{kam} = \frac{22\,410 - 22\,045}{22\,410} \times 100\% = 1.63\%$$

Thus, as a result of taking into account by-products, the cost decreased by an average of 1.63%. This amount represents a saving of 490 million soums from the total production costs.

4. Results of the economic analysis

The results of the analysis provide the following economic conclusions:

Indicators	Unity	Without by-products	With by-products	The difference	Change, %
Total costs	million soums	30 200	28 880	-1 320	-4,37
Average cost	soum	22 410	22 045	-365	-1,63
Profit margin	%	12,8	13,9	1,1	8,6
Resource efficiency	score	0,84	0,91	0,07	8,3

The results show that correctly determining the economic value of by-products and deducting them from the cost of the main product increases the efficiency of the enterprise. The production resource utilization index increased from 0.84 to 0.91, which is a result of converting waste into a useful resource.

5. Economic interpretation of the analysis

By-products affect the cost of the main product in two ways:

1. Direct impact - their value is deducted from the cost and production costs are reduced.

2. Indirect impact - waste recycling creates an additional source of income for the enterprise.

This approach is consistent with the concept of by-product costing put forward by Garrison (2021), that is, taking into account by-products not only reduces costs, but also increases profitability.

Thus, the calculations carried out on the example of “Elegant Garment Textile” LLC show that by evaluating by-products and reflecting them in the management accounting system, it is possible to reduce costs by up to 4.37% and increase production efficiency by up to 6–7%.

Conclusions and recommendations

The results of the study showed that by-products generated in the production process have a significant impact on the overall economic efficiency of the enterprise. By correctly assessing, identifying and deducting them from the cost in the management accounting system, the enterprise accurately and fairly displays its costs.

Based on practical analyses conducted on the example of Elegant Garment Textile LLC, the following conclusions were drawn:

1. As a result of accounting for by-products, the cost of the main product unit decreased by an average of 1.6%, which increased the profitability of the enterprise.
2. By determining the economic value of by-products, it is possible to reduce the cost of production by up to 3–5%.
3. Currently, many enterprises do not have a by-product accounting system or it is carried out in paper form, which limits the rapid exchange of information necessary for management accounting.

In general, the correct reflection of by-products in the management accounting system ensures increased production efficiency, cost optimization, and rational use of economic resources. On this basis, enterprises can organize their activities in accordance with international standards.

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