

## ACTIVITY OF OIL REFINING ENTERPRISES IMPROVEMENT OF MANAGEMENT SYSTEM

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### Abstract

To establish effective inter-country electronic systems and accounting of production costs based on internal standards in order to make rational management decisions in determining the cost of products in oil refining industries in the economy of Uzbekistan. Improving the management system of oil refining enterprises, searching for the most appropriate product cost determination schemes adapted to increase the competitiveness of economic entities, econometric modeling and forecasting of factors affecting production costs, and improving the quality and improvement of raw materials handling services have become urgent issues.

**Keywords:** Oil refining, management system improvement, modeling.

### Introduction

Today, the change in the price of oil resources requires the improvement of the management system of oil refining enterprises. In the economy of Uzbekistan, in order to make rational management decisions in determining the cost of products in the oil refining industries, effective inter-country electronic systems and calculation of production costs are being established on the basis of internal standards.

In the context of a rapidly changing geopolitical situation, attention is paid to the development prospects of oil refining enterprises, the production of competitive products, and the practical implementation of electronic systems. Improving the management system of oil refining enterprises, searching for the most appropriate product costing schemes adapted to increase the competitiveness of economic entities, econometric modeling and forecasting of factors affecting production costs, and improving the quality and improvement of raw materials handling services have become urgent issues.

In order to reduce the participation of the state in the economy of Uzbekistan, it is important to create a competitive environment in oil refining enterprises and gradually reduce the monopoly in the product market. The task of "further modernization and diversification of the industry by transferring high-tech processing networks to a new stage in terms of quality aimed at rapid development of production of finished products with high added value based on deep processing of local raw resources" is set. It is required to use electronic systems for efficient use of resources in oil refining enterprises, to determine the factors of increasing product production and reducing production costs, to improve the management system of enterprise



activities, to introduce internal standards, and to calculate costs.

Classification of production costs in the oil and gas network, methods of determining product costs, methods of calculating and distributing total production costs, choosing methodological bases for accounting in oil processing, and most importantly, correct management accounting for network enterprises. Completely new approaches to implementation are needed.

Grouping of production costs and the need to reveal the changes that occur as the market economy deepens.

Costs are classified on the basis of scientific approaches on economic elements and calculation items, which is presented in Table 1.

**Table 1 Classification of costs in oil refining enterprises**

Production cost of the product	
By economic elements:	According to calculation items:
1. Basic and additional materials	1. Basic and additional material costs
1.1. Raw materials and basic materials	2. Self-produced semi-finished products
1.2. Additional processing components and semi-finished products	3. Direct and indirect cocktail expenses
1.3. All types of energy resources purchased from abroad	insurance and maintenance costs related to production
1.4. Loss, damage and deficiency of material values in the field of production	5. Depreciation of fixed assets and intangible assets of production significance
2. Costs of paying wages to production employees	6. Costs of preparation and development of production of new products
3. Expenditures on social insurance related to production	
4. Depreciation of fixed assets and intangible assets of production importance	
5. Other production costs	

The most appropriate classification for the oil refining industry involves the collection and processing of information on three indicators: material costs, labor costs and general production costs. In this way, the generalized costs are distributed according to the calculation directions : for the calculation and evaluation of the cost of the manufactured product; to make planning and management decisions; for control and regulation. Classification of costs in the cost of production of oil products, along with their composition and structure, differs from that in other sectors and is formed on the basis of a number of characteristics specific to the oil refining industry . The administration of the organization determines the departments in which to classify the production costs , the detailed description of the places of occurrence of the costs. This mainly depends on the scope of the company's activities, the purpose of the products, their



assortment, the nature of the technological process and a number of other factors . These characteristics determine the differences in the documentation of economic operations, data systematization, conducting analytical and synthetic calculations of production, and methods of calculating the price of products (works, services).

In oil refineries, the production process takes place in a large number of devices that are relatively isolated but interconnected at the same time . While the costs are mainly calculated by stages, it has the characteristics of determining the product cost by the types of petroleum products , so the costs are calculated and allocated indirectly to the individual types, only a small part of the processes is simple , and the costs in them are transferred to the product type. possible These are: the process of preparing oil for processing, some types of cleaning of oily fractions, mixing components in the production of commodity products.

of oil product cost has not been adopted, as well as there are no guidelines for the use of one or another method of determining the product cost , in this regard , the industry-related internal rules for the formation of market prices and strengthening the financial condition of enterprises It is desirable to develop a jakik standard.

reformation of economic conditions and the accounting system in accordance with the international standards of financial reporting has increased the interest of current researchers in determining the essence and goals of management accounting. The task of management accounting is to collect relevant (relevant) information for making effective, acceptable and important decisions on improving the production process , which also helps to improve the management process itself seriously and without delay.

It is recommended to develop models for cost accounting and product cost determination in oil refining enterprises in order to facilitate the obtaining of accounting and analytical information for the organization of management accounting. This, in turn, helps to improve the product costing process. The model developed for this work is presented in Table 2.

**Table 2 Proposed stages of cost accounting and product costing in oil refineries.**

The name of the stage		Step definition
1.	Determining the objects of the expense account	Main types of production (oil preparation for processing, vacuum driving in the atmosphere, etc.); stages; technological processes; installation of the device; conditional objects.
2.	Keeping preliminary, analytical and synthetic calculation of production costs	<ol style="list-style-type: none"> <li>1. Raw materials and basic materials: oil, gas condensate, as well as technical infrastructure. Related products, semi-finished products and production services of foreign organizations.</li> <li>2. Semi-finished products produced in-house (vacuum gas oil, direct injection gasoline).</li> <li>3. The cost of recoverable waste (deductible), etc.</li> </ol>

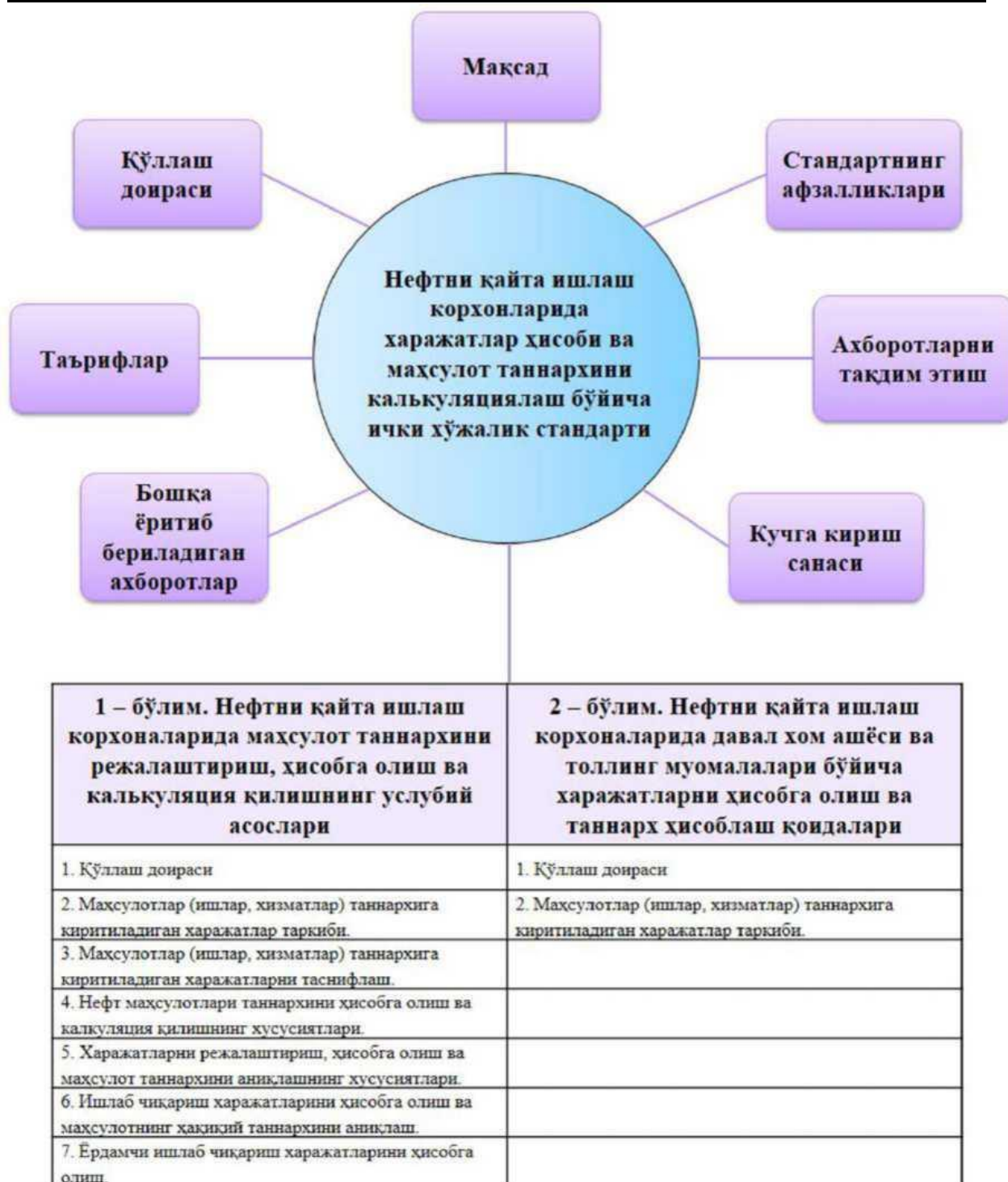


3.	a) Selection of methods of product cost calculation	A step-by-step method of the type of semi-finished product. At all stages (except for the last stage), semi-finished products produced in-house are obtained, the enterprise uses them to continue the technological process at the next stages.
	b) Method of deducting expenses	It is used during the sale of by-products obtained in various production processes. The value of the by-product is deducted from the total amount of expenses using two methods: based on the actual production cost of the by-product, according to the sales price in the reporting period; In relation to the
	c) Types of non-main products and production waste	Non-core products include oxygen and drinking water. The standard method is used to calculate the costs of the oxygen produced, in which the cost is determined according to the approved normative calculation and reduces the costs of the production workshop where oxygen is produced. Production waste for future use in planning and accounting: - when sold abroad - at the prices specified in the contract; - when used in the enterprise itself - it is estimated according to the cost of material and fuel (planned cost or the price of raw materials, materials and other materials that replace it).
4.	Inclusion of calculation objects in the account policy of the enterprise	1 Ton of basic oil products: Gasoline (Ai-80,91 and xk); diesel fuel ECO, EURO 4, 5; jet fuel JET-A1; vacuum gas oil, direct injection gasoline. Related products (compressed petroleum gas (CNG), pyrolysis gasoline, refrigerant propane, nefras, etc.) By-product (fuel oil, paraffin, sulfur, coke)
5.	Calculating the cost of the product and determining the financial result	Calculation of product cost in oil refining enterprises; Determining the financial result by comparing the sales price with the actual cost; Amendments to the business plan of the economic entity; From calculations in the preparation of strategic plans and forecasts use

Formation of management account in oil refining enterprises based on the principles described in the stages presented in **table 2** fit for purpose. The content of the stages of cost accounting has been developed in such a way that it is adapted to the specific conditions of the enterprise. expenses and product costing, the development and use of an internal economic standard in oil refining enterprises leads to the adoption of rational management decisions.

**In picture 1** work developed internal economy standard the project composition given .





**Figure 1. Proposed Draft Internal Economy Standard (IXS) on Cost Accounting and Product Costing in Oil Refineries.**

There are two large oil refineries in Uzbekistan: " Bukhara Oil Refinery" and "Far Gona Oil Refinery" limited liability companies. The tasks of the enterprises are to process hydrocarbon raw materials (oil) and to produce in the necessary volumes and range for continuous supply



of petroleum products, to develop production and the social sector, and to obtain profit for paying dividends .

The production capacity of oil refineries is 11.2 million tons of oil and gas condensate. Such production capacity of the plant allows the production of various brands of automobile gasoline, aviation fuel Djet A-1, various brands of diesel fuel, fuel oil, pyrolysis gasoline, compressed petroleum gas, hydrocarbon solvents, technical sulfur, oils, etc. .

The main problem of oil refining enterprises of Uzbekistan is the supply of oil raw materials in sufficient volume for the capacity of the enterprise, and the volume of processing has decreased compared to previous years. The amount of oil extracted in the republic is insufficient for the operation of oil refining enterprises. One of the promising directions for the development of oil refining enterprises is to increase the volume of products, and in the future to attract foreign investments, the expansion of new production capacities is considered. Enterprises use the price of 1 barrel of Brent crude oil to determine the cost of products.

Figure 2 shows the dynamics of processed raw materials during 2017-2021.

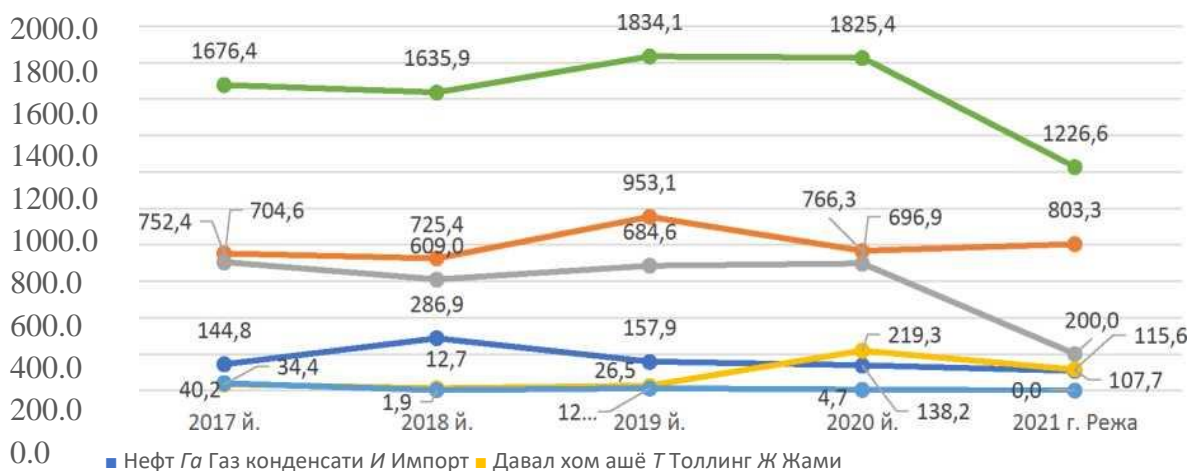
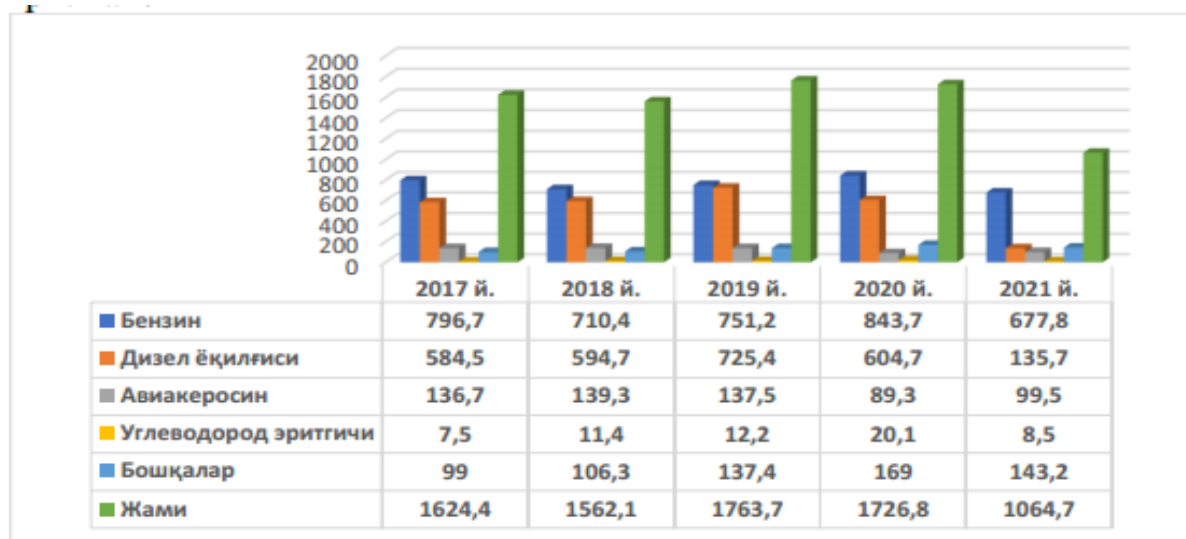


Figure 2. Dynamics of raw material processing at "Bukhara Oil Refinery" limited liability company, thousand tons.

Interruptions in the supply of oil to enterprises often create tension with raw materials in the entire technological chain, which, in turn , leads to long periods of downtime of equipment, underutilization of production capacities , and failure to fulfill the production program. is one of the reasons. The technological level of oil refineries is determined by the ratio of the capacity of secondary processes of processing oil and oil products to the capacity of primary oil extraction facilities. In recent years, capacities of "Bukhara Oil Refinery" and "Fergana Oil Refinery" limited liability companies have been used by 60% and 40%, respectively. The

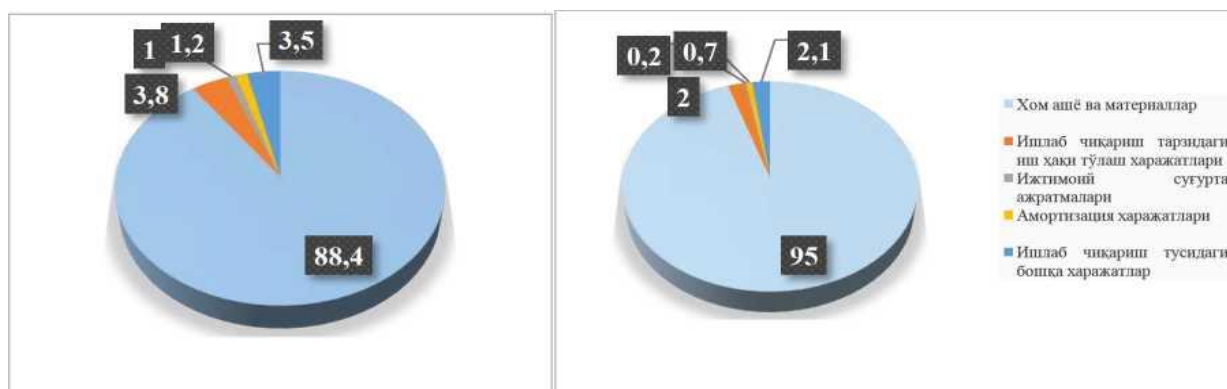
production of products is presented in Figure 3.



**Figure 3. Change in production rate at "Bukhara Oil Refinery" Limited Liability Company, thousand tons**

Based on the analysis of the data of Figure 3, it can be concluded that the enterprise mainly produces gasoline products (64 percent of the total volume). The production volume of diesel fuel and jet fuel will be 13 and 9 percent in 2021.

The share of oil processing costs in total costs varies. If we analyze the information of the "Organizational Expenses" report of the "Fergana Oil Refinery" Limited Liability Company in terms of the factors affecting the cost, their composition is shown as follows: in 2020, raw materials and materials (purchased ) 88.4 percent, production labor costs 3.8 percent, production-related social insurance contributions - 1 percent, depreciation of fixed assets and intangible assets for production purposes - 1.5 percent, other production costs - It was 3.5 percent (4 pictures).



**4 . Production cost structure of "Fergana Oil Refinery" and "Bukhara Oil Refinery" limited liability companies in 2021**

The situation in the limited liability company "Bukhara Oil Refinery" differs in that in 2021, raw materials and materials (purchased) will account for 95 percent, labor costs for



approximately 2 percent, social insurance contributions related to production - 0.2 percent, depreciation of fixed assets and intangible assets for production purposes - 0.7 percent, other production costs - 2.1 percent. Also, when analyzing the cost, it was found that the cost of imported raw materials was 62 percent, and in 2020, the cost of domestic raw materials was 30 percent. Other components of the product cost - material costs, costs of purchased materials, costs of all types of energy, as well as costs of payment for cocktails, loading costs account for 1-2 percent, and the total amount is 8 percent of production costs. Therefore, reducing the number of production employees in order to reduce labor costs or introducing energy-saving technologies in order to reduce electricity consumption will not have a significant effect.

finished types of fractional method of cost accounting and cost determination are used in oil refining enterprises . Each unit (device) that produces certain types of semi-finished products and finished products is recognized as an independent process, which is then considered an object of cost calculation.

Determining the costs of each technological process of oil refining is carried out by allocating sub-accounts to each separate process (stage) or installation in the main production account. Production is complex, when determining the cost of the main product, the value of ancillary products is deducted from the total costs of the technological process (stage), and the remaining costs are divided by the total size of the main product, taking into account the distribution coefficients .

Other production costs included in the product cost are analyzed in **Table 3** .

**Table 3** "Fergana Oil Refinery" Limited Liability Company is another analysis of production costs, mln. m

Indicator name	2020	2021	2022	2023	Absolute change	Growth rate,%
Other production costs, total	69 184.4	6 5 125.3	41 195.4	49,622.4	10, 427	137
Including : mandatory and voluntary insurance of production personnel and production assets	322.8	492.8	210.0	260.3	50.3	134
Business travel expenses	371.0	120.5	53.2	105.4	52.2	200
of which: daily expenses	304.5	89.4	36.02	68.3	42.28	172
In addition to office, fire and emergency drying service costs	35,890.7	40,588.6	23 325.8	30283.4	6 957.6	140
Payment of temporary disability allowances to production workers	3 350.9	3 790.0	2 532.9	6 843.5	3 310.6	240
Other costs related to the production process	19 249.0	10 133.4	6 073.5	3 129.8	-1943.7	72



Under the item "Other expenses related to production " amounted to 31,195.4 million soums, and in 2021, they amounted to 39,622.4 million soums, which means that these expenses increased by 127%. In the analyzed period, among other expenses, the main amount is made up of the article "Outside the office, anti- fire and security protection". In the composition of other expenses, this item made up 78.8 percent in 2020 and 86.5 percent in 2023.

the oil refinery from not fully using its production capacity is to provide services for the processing of customer raw materials of the refining enterprises .

The profitability of providing services on the basis of raw materials increases, because the working capital is significantly saved. It is necessary to analyze how the technological features of the oil refining sector affect the organization of accounting for services for the processing of Daval raw materials. As of the beginning of 2021, the share of recycled raw materials in the oil refineries of the republic was approximately 20-35 percent of the total volume of raw materials processed in 2022. 2023 " Uzbekneftegaz " joint-stock company and oil refining enterprises concluded a contract based on daval raw materials, as a result of which the service based on daval raw materials increased to 90%.

accounts in the current chart of accounts creates a methodical basis for the accurate, reliable and completeness of the accounting work, and for making quick management decisions.

Production requires cost accounting and product costing by production processes, product types, and organization of the entire product and unit of product. In this, it is necessary to take into account and estimate costs of work-in-progress, manufacturing defects, as well as waste and by-products. All of this can be achieved by properly choosing the systems and methods of cost accounting and product costing . Uzbek industrial enterprises use the "Direct-costing" method, in which costs are divided into variable and fixed costs. If we consider the foreign experience, "target-costing" is divided into the expected sales value method, the expected net value method and the fixed percentage of gross profit method. is proposed and can be seen in Table 4 below.

**Table 4** Analysis of the effectiveness of methods of calculating the production cost of products in oil refining enterprises, in thousand soums per ton

T. r-	Product name	Actual calculated cost of the product	Under the expected realizable value method	According to the fixed percentage of gross profit method	Under the expected net value method
1.	Gasoline Ai-80	4 025.9	2 960.1	2 945.9	2 954.5
2.	Gasoline Ai-91	4 099.6	3 805.1	3 874.9	3 832.9
3.	Gasoline Ai-92	4 110.1	3 754.8	4 271.0	3 793.9
4.	Gasoline Ai-95	4 136, 6	4 136.4	4 206.8	4 166.2

**In Table 4**, the following important conclusions can be drawn: the cost of Ai-80 gasoline calculated by the method of expected profit value is 30% less than the cost calculated at the factory, we can also observe that the cost of finished products is significantly different than the factory cost index. The change in cost was influenced by the price of gasoline indicated on the stock exchange and, accordingly, the share of oil products in the total volume of production. But at the same time, there are disadvantages of the method, such as fluctuations in determining the retail price intended for each type of activity, as a result of which it is necessary to constantly monitor and analyze the market. Therefore, it also causes additional costs.

Additional expenses of the enterprise are taken into account in the cost of production calculated by the method of expected net value. As a rule, additional costs are the costs of bringing the obtained oil products up to standard quality and the subsequent costs of the finished product, i.e. transportation to the storage point, product storage costs, and other costs. Accordingly, the unit cost of the produced product will be lower and will be 2,954,000 soums for 1 ton of Ai-80 gasoline, as the expected income will be reduced by the amount of additional costs. The advantage of the expected net income value method: the enterprise changes the conditions of product storage; to choose an alternative method of transport; can use the services of another transport company, and the company can reduce the volume of finished products in the warehouses of the company in order to reduce additional costs.

the fixed gross profit method is the assumption that costs for all types of products have the same share of revenue. According to the calculations, the production cost of Ai-92 and Ai-95 gasoline is higher than the amount calculated in traditional cost calculation methods. The quality of gasoline of this brand is high, but there is not much demand for it in our republic, so the price increase is against the interests of the manufacturer. Based on the study of foreign experience, we can note that for oil refining enterprises, the methods of allocating complex costs on the basis of market indicators are preferred, in which the method of the value of net income from sales is chosen.

The fixed product cost is considered the most suitable and acceptable option in the formation of the product price, which allows the company to get a profitable discount. Applying this expected net income value method can prevent errors in the costing of individual products for future management decisions. According to calculations, the cost of Ai-80 gasoline decreased by 26%, the cost of Ai-91 gasoline - by 7%, and Ai-92 - by 8.5%. Thus, this method can be an acceptable solution for oil processing enterprises in Uzbekistan.

Applying a differentiated approach to factory costing based on customer categories involves the calculation of the service price according to variable costs, which in turn reduces the service price, but at the same time increases the production capacity of the plant.

In the oil refining industry, special attention has been paid to ways of reducing production costs, and various methods and schemes have been developed to reduce costs and increase the share of net income. Therefore, it is important to create multi-factor econometric models to analyze the factors affecting the cost of production and to forecast them in the short and long term.

Based on the research tasks, the following factors were selected to create a multi-factor econometric model: as a result factor - product cost of oil refining enterprises, million soums - (Y), and influencing factors - raw materials and material costs, mln soums- (X1), labor costs of production employees, million soums, (X2), social security expenses, million soums, (X3),



depreciation expenses, million soums, (X4) and electricity costs, million soums, (X5) were taken.

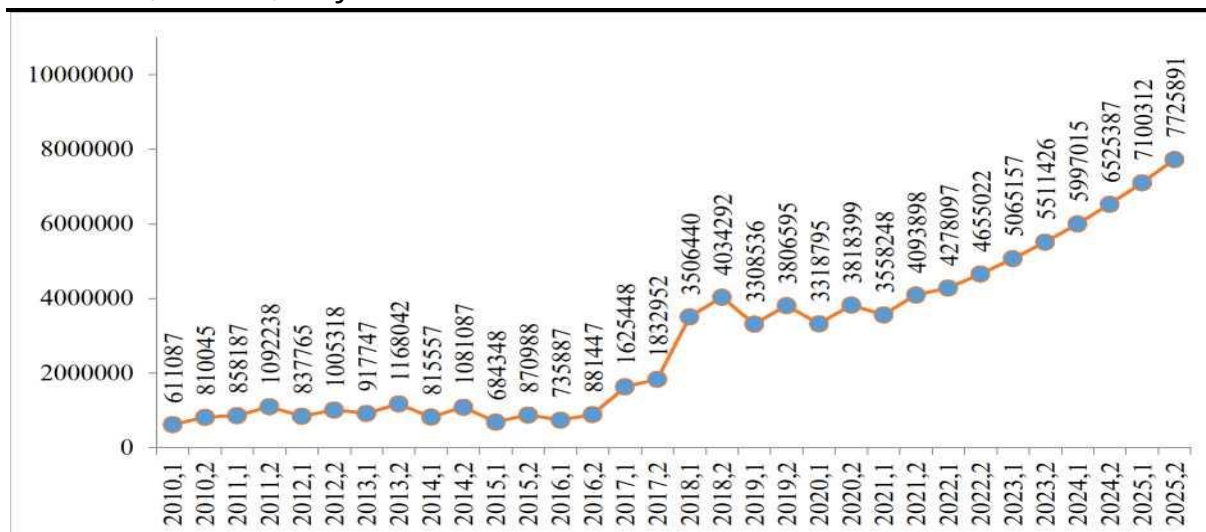
The analysis of the trend models between the influencing factors and the time factor shows that the statistical significance of all calculated coefficients in these models and the reliability of their parameters are determined. So, we calculate these trend models and, putting their calculated values into a multifactor econometric model, we first calculate the forecast values of the influencing factors, and then make the forecast calculations of the resulting factor. As a result, we have the values of the variables included in the multifactor econometric model of the price of oil refining products of the Republic of Uzbekistan during the forecast period ( Table 6).

**Table 6 Values of forecast calculations of product cost of oil refineries and factors affecting it.**

Years and half-years	Product cost Y, mln. soums	Costs of raw materials and materials, X 1, mln. soums	Production employees' salary expenses, X 2, mln. soums	Social insurance expenses X 3, mln. soums	Depreciation expenses X 4, mln. soums	Electricity costs X 5, mln. soums
2016.1	735 887.1	521 386.4	61101.9	13687.76	37767.14	25246.87
2016.2	881 447.1	564 835.2	58705.8	16068.24	39308.66	20656.53
2017.1	1 625 448	1 054 119	89303.4	21108.96	27794.4	28745.84
2017.2	1 832 952	1 341 605	98703.7	22868.04	35374.7	27618.56
2018.1	3 506 440	3 280 298	68884.9	15596.19	28023.02	36171.63
2018.2	4 034 292	3,699,060	74625.4	19062.01	32896.58	29594.97
2019.1	3 308 536	2729312	94895.6	19043.2	29693.78	52031.36
2019.2	3,806,595	3 617 926	100765.4	21474.2	39361.52	48028.94
2020.1	3 318 795	2,855,977	158560.2	18812.2	43424.51	61880.73
2020.2	3 818 399	3 352 668	171773.5	19580.1	53074.4	54875.37
2021.1	3 558 248	3 140 228	174779.7	18968.2	48357.84	66176.83
2021.2	4,093,898	3401914	189344.7	22267.0	52387.66	54144.68
2022.1*	4,278,097	3493798	188631.4	27794.9	50867.02	48264.42
2022.2*	4,655,022	3807259	205392.9	29386.8	52705.76	49751.7
2023.1*	5,065,157	4148843	223643.8	31069.7	54610.97	51284.82
2023.2*	5 511 426	4521073	243516.5	32849.1	56585.04	52865.17
2024.1*	5,997,015	4926700	265155.0	34730.4	58630.48	54494.22
2024.2*	6 525 387	5368720	288716.3	36719.4	60749.86	56173.48
2025.1*	7 100 312	5850397	314371.2	38822.3	62945.84	57904.48
2025.2*	7,725,891	6375289	342305.8	41045.6	65221.21	59688.82

can be seen from the data of **Table 6** that the cost of production amounted to 1,617.3 billion soums at the end of 2016, and 7,137.2 billion soums in the second half of 2020 . 14,826.2 billion soums in the second half of 2025 (compared to 2020 2.15 times growth ) is expected . The main reason for this is the increasingly complex production of products in the oil refining industry, the growing demand for oil products in the world, and other factors.





**Figure 5. Production cost dynamics in the oil refining industry of Uzbekistan and forecast values for the next period, mln . soum**

Raw materials and materials amounted to 1,086.2 billion soums in the second half of 2016, and 6,208.6 billion soums at the end of 2020 (a 3.5-fold increase compared to 2016), this indicator At the end of 2025, it amounted to 12,225.7 billion soums (196.9% increase compared to 2020).

**X ulosa** . The current state of the oil refining network, technological features of production and their impact on cost formation were analyzed in the scientific work, international experiences in this regard were summarized, and scientific proposals and practical recommendations were given to reduce product costs. A comparative analysis of the advantages of the methods of calculating the production cost of products in oil refining enterprises. From these methods, it was determined that the cost determination according to the expected net value method is effective, in particular, as a result of its implementation, for example, the cost of Ai-80 gasoline is on average 26%, that of Ai-91 is 7%, and the cost of Ai-92 gasoline is on average 8 The possibility of reduction by 5% has been proved on the basis of calculations.

The processing capacity of the republic's oil refining enterprises is approximately 11.5 mln. tons of oil and gas condensate, but the operating enterprises are actually working at 50-60 percent capacity. In order to effectively use these capacities, the need to provide foreign services based on tolling transactions and processing of raw materials is based on the scientific work. For this purpose, options for the change of profit in different scenarios of profitability during the processing of daival raw materials have been developed.

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