Methods of Evaluating the Efficiency of Use of Economic Resources in Industrial Enterprises

Doniyorova Shakhnoza Doniyorovna

Tashkent State University of Economics, independent researcher
Email: doniyorovashaxnoza78@gmail.com
Mobile: 90 187-49-55

ABSTRACT

The article analyzes the methods of evaluating the efficiency of the use of economic resources in industrial enterprises in the context of the development of modern industries. In the process of comprehensive assessment of the efficiency of industrial enterprises, classification of its criteria and indicators is scientifically based. Also, the method of evaluating the efficiency of the use of economic resources in the enterprise has been improved based on the factors determining the impact on the rational use of resources and the indices describing the economic development of their enterprises and industrial areas.

Keywords:	industry, production, enterprise, resources, industrial economy, efficiency, cost, criterion, finance, economic resources, economic indicators, integrated assessment, labor efficiency.

Introduction

Currently, in developed countries, due to the implementation of the "industry 4" stage, with the expansion of modern industrial sectors, special attention is paid to the research of the issues of evaluating the efficiency of the activities carried out in the production process. At this point, it is necessary to pay attention to the content of "efficiency" and "effectiveness of use of economic resources" at the initial stage of research.

The concept of efficiency as a complex, comprehensive category has several interpretations in the scientific literature (efficieny - English), based on the widespread expression "efficieny", it is explained by such concepts as efficiency, mobility, productivity, ability to move, operativeness [1]. Currently, there are many definitions of the concept of "efficiency", which are used not only in economics, but also in other disciplines.

"Efficiency" in economics has broad and narrow definitions, which are interpreted as complementary concepts. In a broad sense, the concept of "efficiency" is interpreted as the ability to effectively and adequately approach the environment [2], relative efficiency, operations and projects [3].

In clarifying the essence of "efficiency", it can be seen that it has several resources. Because this concept has a complex description, it is determined by several criteria and indicators.

Efficiency is the search for the best solutions for the purpose of achieving higher results in one or another field of labor activity and reducing costs per unit of these results [3].

In order to discuss how effective this or that system of economic activity in industrial enterprises is, naturally, criteria are needed that allow such an assessment. The analysis of publications in this field allows to distinguish two concepts that are the basis of the evaluation of economic activity. According to the first of them, the efficiency of personnel activity is evaluated based on the integral unity

of management and production, but it does not determine the share of personal management of employees in production efficiency. The second concept focuses on determining the share of personnel management in production efficiency [4].

Analysis of literature on the subject

Research scientists have given many definitions to economic resources as an economic term, taking into account various aspects of enterprise activity, and scientific approaches are based on them. In particular: K. McConnell and S. Brew [5, vol. 1. - 1992. - 339 p.; t. 2 - 1992. - 400 p.] said that the concept of "economic resources" means all natural, human and man-made resources used for the production of goods and services. In the source of the dictionary "Bolshoy ekonomicheski slovar" published under the editorship of AN Azriliyan [6, 776 p.], economic resources are defined as: "Factors of production are elements necessary for the production of products, goods and services."

According to Russian scientists R. Nureev, ADS Mirnov [7, 440 p.]: "Economic resources (or factors of production) are elements used for the production of economic products: in modern society, the most important of them are land, labor, capital (including its organization entrepreneurship skills and information" was researched. MKBunkina, VASemenov [8, 272 p.] say: "A large mass of goods intended for sale are utility services in material form. Four main factors interact in their production: natural resources, labor, capital and entrepreneurship.

Also, BA Reisberg [9, 716 p.] believes that factors are parameters that determine the nature and efficiency of economic processes.

Research Methodology

In the research process, the scientific basis of the methodological approach to the development of economic resources in industrial enterprises, the formation of economic resources, the main directions of the use of economic resources, the indicators of the evaluation of the effectiveness of the use of these resources in industrial enterprises, the integrated economic effect obtained from the use of economic resources in industrial enterprises, the direction of increasing economic efficiency A systematic and scientific approach, comparative and comparative analysis and grouping methods were used to study economic systems and ratios

Analysis and results

Evaluating the efficiency of the enterprise in the form of value is a complicated process, since there are no relevant accounting indicators. Therefore, most of the methods of evaluating the efficiency of economic activity support the first approach.

In the process of comprehensive evaluation of the efficiency of industrial enterprises, it is necessary to classify its criteria and indicators.

When choosing evaluation criteria, it is necessary to take into account the following: firstly, what specific tasks will be used to solve the evaluation results, and secondly, the criteria are set for certain categories of employees, taking into account their classification according to the complexity, responsibility and nature of their activities.

The criteria for determining the efficiency of the enterprise may be the fulfillment of the established standards of production or service in the reduction of costs caused by the quality of products and employee incompetence, unjustified costs, etc.
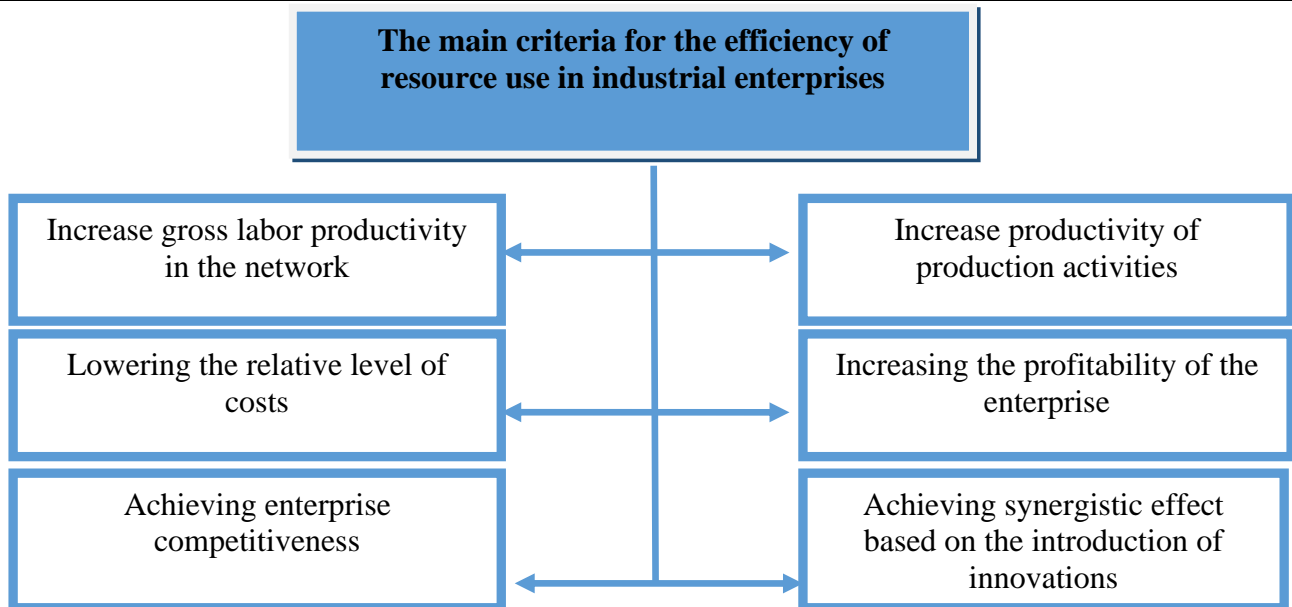
Figure 1. The main criteria for the efficiency of resource use in industrial enterprises*
Source: developed by the author.

In our opinion, comprehensive analysis of efficiency in industrial enterprises should not be limited to its criterion. In this case, the criterion is not formed as a measuring and evaluation tool. Because the criterion for determining efficiency is to save labor, increase labor productivity, reduce labor capacity, and achieve high economic efficiency. In this case, the task of evaluation is carried out through performance indicators. In industrial enterprises, based on the objectives of the efficiency improvement criterion, efficiency is determined by means of indicators representing production processes.

The role of modern industries in our republic is of particular importance and plays an important role in the development of other leading sectors of the economy. Accordingly, the criteria for evaluating economic efficiency in this sector are presented in Figure 1. These criteria are gross labor productivity[1]increase, reduce the relative level of production costs, ensure the competitiveness of the enterprise in the market, increase the profitability of the enterprise, increase the efficiency of economic activity, increase the profitability of the enterprise, achieve synergistic effect based on the introduction of innovations.

The analysis of scientific concepts makes it possible to distinguish three methodological approaches to the assessment of socio-economic efficiency.

Supporters of the first approach believe that the personnel of the enterprise has a direct impact on the production process, so the final results of production are evaluated based on certain performance criteria. As these indicators, the final results for the specific period of the enterprise's activity (year, quarter, month): that is, the volume of goods; enterprise profit (balanced, gross, net; expenses (cost) per one soum product); profitability indicators; volume of sold products (revenue); product quality; enterprise income (gross, net); production culture; dividends per share (ordinary and preferential); coefficient of economic efficiency; payback period of capital costs.

According to the second approach, the criterion indicators for evaluating the efficiency of the enterprise should represent the result and quality of labor activity. Such indicators include: labor

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[1]Gross productivity is an indicator that classifies the ratio of all resources used as a factor of production to all final results, and represents gross activity efficiency.

productivity; total wage fund; the weight of wages in the product cost; the ratio between labor productivity and wage growth rates; percentage of compliance with production standards; the quality of workers' work (the percentage of defective products); loss of working time (during the whole day and within the shift); arming labor with funds; mechanical equipment of labor, labor capacity of the product; coefficient of labor complexity; occupational injury rate; total number of personnel.

These indicators represent labor efficiency in an industrial enterprise and are the basis for choosing its criteria.

According to the third approach, efficiency depends more on the organization of production in an industrial enterprise, labor motivation, and the social environment in the team. Indicators of labor efficiency according to the criteria include the following: employee qualification level, employee unemployment, professional-qualification structure, level of labor and executive discipline, use of working time fund, employee-employee ratio, social structure of employees , equality of employment of employees, severity of labor discipline violations, costs per employee, reliability of employees' work, management costs, socio-psychological environment in the team, implementation of social development plan, etc. This approach differs from previous approaches to live work, i.e. it is more stratified, taking into account the individual characteristics of performers and their ability to be together in groups.

In our opinion, it is necessary to combine the advantages of the above-mentioned concepts, the main reason for which these indicators do not exclude each other, but complement each other. In the first concept, the total resources of the enterprise - material, financial and labor, in the second concept - mainly labor; in the third concept - it consists of individual differentiated labor resources.

At this point, let's focus on the indicators that represent the efficiency of the use of economic resources in industrial enterprises. Economic resources as a category of production have both qualitative and quantitative characteristics.

The income from the sale of products plays an important role in the activity of industrial enterprises. The competitiveness of the enterprise is directly related to the level of development of its production capacity.

If we take into account the production potential of an industrial enterprise, it includes the following resources:

- the quality composition of labor resources and labor potential, which depends on the number of employees, their qualifications, and the level and quality of the performance of assigned tasks;

- the potential of the corporate management system, which depends on the level of optimal distribution of industrial production factors;

- financial potential - it depends on the resources of the industrial enterprise necessary for its activity.

We have developed a classification of indicators representing the efficiency of the use of economic resources in industrial enterprises. They are listed in Table 1 below.

Table 1
A system of indicators representing the efficiency of the use of economic resources in industrial enterprises*

T/r	Indicators	Determination	Calculation algorithm	Conditional signs
		On material and technical resources		
2.	Material capacity of the product	The amount of material costs per 1 soum of the product	$$M_s = \frac{M_x}{Q_m}$$	M_s - material capacity of the product; M_x - volume of material costs in the enterprise; Q_m - product volume.

3.	Material return of the product	Production volume corresponding to 1 soum of material and technical resources consumed	$$M_q = \dfrac{1}{M_s}$$	M_q - material return of the product;
4.	Relative weight of material costs in the product cost	Level of use of material technical resources and its weight	$$C_{\text{мх}} = \dfrac{\sum M_x}{T_m}$$	S_{mx} - relative weight of material costs; M_x - the amount of material costs; Tt is the full cost.
5.	Capacity of funds	Cost of fixed assets per unit of product	$$F_c = \dfrac{\sum AF}{T_c}$$	AF – average annual value of basic funds; T_s - income from sales.
6.	Absolute growth of material reserves	Changes in material reserves in absolute units	$$U_m = MZ_h - MZ_j$$	MZ_h - volume of material reserves during the reporting period; MZ_j - volume of material reserves in the current period;
7.	Turnover coefficient of material reserves	Material stock turnover number	$$MZ_a = \dfrac{T_c}{MZ_{o'q}}$$	MZ_a - turnover coefficient of material reserves; MZ_{oq} - average annual value of material reserves.
8.	Raw material capacity of the product	The efficiency of consumption of raw materials in the production process per unit of product	$$M_{xc} = \dfrac{X_q}{M_q}$$	M_{xs} – raw material capacity of the product; X_q – the value of consumed raw materials; M_q - product value;
9.	The relative material capacity of the product	The volume of material costs spent on one unit of product	$$M_{cmc} = \dfrac{I_m}{N_m}$$	I_m - cost of materials used in the product; N_m is the price of the product.
10.	Relative weight of material reserves	Represents the share of tangible reserves in current assets	$$MZ_{cc} = \dfrac{MZ}{A_a}$$	MZ_{cc} - relative weight of material reserves; MZ - volume of material reserves; A_a – Current assets.
11.	Cycle period of material reserves	The average period of storage of material reserves	$$MZ_{ad} = \dfrac{MZ_{o'q} \times K}{T_c}$$	MZ_{ad} - period of circulation of material reserves; MZ_{oq} - average annual value of material reserves; K is the number of days.
12.	Relative	Represents the sum	$$D = MZ_{yo} - MZ_{yb} \times T_{o's}$$	MZ_{yo} - volume of material

	saving of material resources	of relative savings of material resources		reserves at the end of the year; MZ_{yb} - volume of material reserves per year; T_{os} is the growth rate of sales revenue.

Source: developed by the author.

Effective use of economic resources is one of the important factors of increasing the efficiency of industrial enterprises. During the use of economic resources in industrial enterprises, their transformation into material costs occurs. Therefore, the rational use of economic resources leads to a decrease in the cost of products and is considered a factor in increasing the profit and profitability of the enterprise.

In that case, the national income is determined by multiplying the value of hours worked by the ratio of labor to arming with funds by the return on funds. These ratios show that the fund capacity of the national income (or the fund return of the national income) appears only as one of the factors determining the movement and size of the national income and cannot be considered as the only generalizing indicator of the efficiency of social production. In this case, the intensive growth of national income can be determined at the expense of increasing labor productivity with an increase or even decrease in the number of employees.

The interrelationship of various indicators describing the impact of various factors on the reproduction of products shows that the change in the efficiency of social production depends on labor productivity (expressed in output or national income) and the return of funds (circulating capital taking into account) is determined by the growth rate and their ratio.

The increase in the efficiency of the entire social production will increase only in the conditions where the growth of output and national income is ensured by the increase of labor productivity and the profitability of funds, and the growth of production and national income is achieved at a rapid pace.

Due to technological development, in the conditions of the increase in the level of labor's arming with funds, the fund capacity and the fund return index have the greatest impact on the efficiency of the entire social production.

Currently, the most important problem of the development of the real economy is to increase the efficiency of the use of fixed and circulating funds, to ensure the growth of labor productivity, to introduce innovations into production, to improve the quality of products and to increase the profitability of the enterprise, to develop innovative and investment activities in the industry.

The reasonable level of consumption of the resources available in the enterprise in the production process is characterized by the efficiency of their use.

In our opinion, the resource intensity of production means the amount of resources used to produce a unit of final product, that is, the ratio between the consumed resources and the produced product (in material form or in the form of services).

Resource intensity is characterized by indicators of material density and energy intensity.

Resource efficiency is an indicator that represents the use of material and energy resources for the manufactured product. The indicator of the economic efficiency of the use of all resources of production in industrial enterprises is the return of resources (R_q) and the capacity of resources (R_s):

$$R_q = \frac{YM}{RS}, \qquad R_s = \frac{RS}{YM}, \qquad (1)$$

where: YM - gross product volume, mln. soum;
RS - size of resource potential, mln. soum.

The integral indicator of the efficiency of the introduction of production resources is determined based on the following formula:

$$K_i = \frac{YM_1}{M},\qquad(2)$$

where: YM_1 is the actual gross product;

M is the normative level of gross product production volume representing the production potential of the enterprise.

Among the existing methods of evaluating and optimizing the efficiency of the use of enterprise resources, the financial approach, which includes the calculation of financial returns, and the mixed approach, which also includes a non-financial component, are the most common. If we consider the issues of efficient use of resources, they are relevant for the management of enterprises of all types and forms of ownership.

When evaluating the overall efficiency of resource use, it is appropriate to describe the availability of financial resources necessary for the stable operation of the enterprise, to analyze their location and movement in the production process [10].

Therefore, the integrated indicator (C) determining the effect of the rational use of its resources on the increase in the efficiency of the enterprise is the factor of labor resources (K_1), resources used in production (K_2), natural resources (K_3), use of intellectual and informational resources (K_4). , evaluated on the basis of indicators representing financial resources (K_5):

$$C = F \sum K1^n,\qquad(3)$$

where: S is the efficiency of rational use of resources;

K_1 - indices describing the factors and their influence on the economic development of enterprises and industrial regions (n=1; 2; 3; 4; 5).

Thus, the methodological foundations of effective use of economic resources in the activities of enterprises are as follows:

- the possibility of creating a new structure of enterprise resource management

and increasing objectivity in the perspective of their use;

- use of innovative technologies and resources in product production. In this case, the concept of limited resources becomes the concept of relativity of resources, that is, taking into account the need for resources, allows developing selected modern programs for the development of an industrial enterprise in order to develop the most effective project for their use;

- planning the operational activities of the enterprise in order to reduce production and other types of costs and increase the efficiency of resource use;

- effective use of the internal economic mechanism and modern methods of cost formation in the process of enterprise tax planning in order to reduce the financial and economic risks of the enterprise;

- determination of goals, volume of sales, provision of optimal resources in the development of strategic and prospective business decisions for the development of an industrial enterprise.

Methodological foundations of effective use of resources are aimed at improving the scientific, theoretical foundations and conceptual approach for the purpose of their rational practical application, and they are determined by the types and characteristics of resources, internal and external economic relations for a certain assortment and assortment of products.

There is a simple two-resource model that shows the substitutability and substitutability of economic resources, which is called the Cobb-Douglas model after two American economists [11]. This model looks like this:

$$Q = AK^{\alpha}L^{\beta},\qquad(4)$$

where: Q is the volume of production;

K – amount of capital;

L - labor cost;

a, b - indicators of production elasticity in relation to capital and labor (they show how

much Q can increase if K or L increases by one percent);

A is a coefficient that determines the change in labor productivity due to the introduction of new technology.

In the course of this research, in order to improve the above model, it can be noted that the entrepreneur should in any case maintain the relationship between various factors of production and achieve the main criterion - minimum costs.

In our opinion, the following rule should be followed: the ratio between the number of factors of production should be such that the ratio of one factor to the price of final productivity should be equal to the ratio of final productivity of another factor, and so on.

$$\frac{YU_1}{B_1} = \frac{YU_2}{B_2} = \dots = \frac{YU_n}{B_n},$$
(5)

where: YU_1, YU_2, YU_3... YU_n - respectively 1,2,3...n - the final productivity of the economic resource;

B1 B2 B3...Bn - respectively 1,2,3...n - the value of the economic resource.

The final productivity of the factor is determined by the rate of increase in the volume of output created by the last unit of the factor involved in production (machine, lathe, worker, etc.).

Given that the product produced in the enterprise generates income after it is sold, the final productivity can be determined in the form of additional income obtained from the last factor unit involved in production. Labor, capital, material and natural resources, as well as financial resources, are important for production enterprises in the conditions of a market economy. In enterprises, the process of extended reproduction continues continuously and consists of four interrelated stages, namely production, distribution, exchange and consumption stages. In this process, the movement of production factors is important, and this movement has a closed periodic form consisting of several phases. The direct production stage is dominated by production factors, but it is the preparatory stage at the

beginning of the stage when factors appear in the form of production resources.

Conclusions and suggestions

The following conclusions were formed as a result of research conducted on the analysis of the methods of evaluating the efficiency of the use of economic resources in industrial enterprises:

1. In order to discuss how effective this or that system of economic activity in industrial enterprises is, of course, criteria that allow such an assessment are needed. The analysis of publications in this field allows to distinguish two concepts that are the basis of the evaluation of economic activity. According to the first of them, the efficiency of personnel activity is evaluated based on the integral unity of management and production, but the share of personal management of employees in production efficiency is not determined. The second concept focuses on determining the share of personnel management in production efficiency.

2. It is necessary to classify its criteria and indicators in the process of comprehensive evaluation of the efficiency of industrial enterprises. When choosing evaluation criteria, it is necessary to take into account the following: firstly, what specific tasks are used to solve the evaluation results, and secondly, the criteria are set for certain categories of employees, taking into account their classification according to the complexity, responsibility and nature of their activities.

3. The method of evaluating the efficiency of the use of economic resources in the enterprise was improved on the basis of the factors determining the impact on the rational use of resources and the indices describing the economic development of their enterprises and industrial areas.

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