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## THE IMPORTANCE OF IMPROVING RESOURCE USE EFFICIENCY IN THE DEVELOPMENT OF INDUSTRIAL ENTERPRISES

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### Abstract

This article analyzes the essence of the concept of resource use efficiency, its role in the economy of industrial enterprises, and the specific features of its application in the grain products industry. The findings show that the rational use of resources is an important factor in increasing the competitiveness of enterprises, reducing production costs, and ensuring sustainable industrial development.

**Keywords:** Industrial enterprises, resource efficiency, economic efficiency, technical efficiency, modernization, innovative technologies, energy saving, investment resources.

### Introduction

Under conditions of limited economic resources, achieving maximum results from each unit of resource has become a matter of strategic importance. Therefore, improving the efficiency of using available resources has become one of the most important factors for the sustainable development of industrial enterprises. This necessity is especially significant in industries with high resource consumption, where increasing the efficiency of energy, water, and material resources is essential. Rational resource management enhances the competitiveness of enterprises, reduces production costs, and increases profitability.



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## **Literature Review**

The concept of “efficiency” has been a subject of discussion in economic science since the 18th century and has been studied by various theoretical schools using different approaches. However, the common aspect of all approaches is the idea of obtaining maximum results from limited resources.

A. Smith, in his work *“An Inquiry into the Nature and Causes of the Wealth of Nations,”* theoretically substantiated the possibility of increasing productivity through the division of labor and specialization [1]. Ricardo, in his theory of comparative advantage, proved that countries specializing in sectors corresponding to their relative advantages leads to a more efficient allocation of resources [2].

Later, representatives of neoclassical economics such as L. Walras, A. Marshall, and V. Pareto developed the mathematical and theoretical foundations of economic efficiency. Neoclassical economists associated efficiency with the optimal allocation of resources. In their view, the main objective is to maximize benefits from limited resources, minimize costs, and maximize profits. In *“Elements of Pure Economics,”* L. Walras was among the first to describe the general equilibrium of resource allocation through a system of mathematical equations [3]. A. Marshall, in *“Principles of Economics,”* developed marginal analysis as a practical tool and demonstrated how prices regulate the flow of resources [4]. Vilfredo Pareto defined the equilibrium state of optimal resource allocation — a situation in which the condition of one participant cannot be improved without worsening the condition of another — as the main criterion of economic efficiency [5]. The concept of “Pareto efficiency” later became the foundation of all efficiency theories and still serves as the methodological basis for performance analysis.

From the second half of the 20th century, methods for quantitatively evaluating efficiency began to develop. In his article *“The Measurement of Productive Efficiency,”* M. Farrell developed a methodology for assessing technical efficiency relative to the production possibility frontier [6]. He divided efficiency into two components — technical efficiency and allocative efficiency — and empirically measured them for the first time. Later, T. Koopmans linked the mathematics of performance efficiency within “activity analysis” to the



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concept of Pareto optimality [7]. Thus, the transition from classical theory to quantitative frontier analysis was achieved.

Modern efficiency theory, based on the works of Farrell, Koopmans, Caves, Christensen, and others, identifies five main types of efficiency, all of which collectively express the overall productivity of enterprise resources. Technical efficiency reflects the degree of utilization of existing technological capabilities, while allocative efficiency ensures the optimal allocation of resources according to prices. The combination of these two forms economic efficiency, that is, the ability to achieve a given result with minimum cost. Scale efficiency reflects the dynamics of costs in response to changes in production volume and is especially important in the grain products industry, where the unit cost of production in large mills may be significantly lower than in small enterprises. Dynamic efficiency reflects the ability to improve all other forms of efficiency over time through innovation and technological modernization.

### **Results and Discussion**

The above analysis shows that the issue of efficiency has been widely studied in economic literature by various economists, and this concept reflects the degree to which available resources are used productively in the production process. Economic efficiency is an indicator expressing the economic result obtained through a certain amount of resource expenditure. It is generally determined as the ratio of results to costs:

$$\text{Efficiency} = \frac{\text{Result (output, income, or profit)}}{\text{Costs (labor, capital, raw materials, energy resources)}}$$

A high level of economic efficiency indicates the rational use of resources.

In modern economic literature, economic efficiency is studied in several areas, including production efficiency, labor efficiency, investment efficiency, energy and resource efficiency, and innovation efficiency. To evaluate the performance of enterprises and organizations, a system of indicators is used, including labor productivity, profitability, capital productivity, material intensity, and energy efficiency, which reflect the productivity of production factors and the degree of their effective utilization.



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It is well known that industry is the backbone sector of the economy, forming the main share of gross domestic product, providing employment for the population, and increasing export potential. It supplies all sectors with technology and raw materials, thereby determining the economic stability and defense capability of the state. According to preliminary data from the National Statistics Committee, industrial production in Uzbekistan reached 1.1 quadrillion soums in 2025. This figure increased by 6.8% compared to the previous year, while the share of industry in GDP amounted to 26.8%. Industrial production per capita reached 29.1 million soums nationwide [8].

As of March 1, 2026, there were 61.8 thousand industrial enterprises operating in the republic. During January–February 2026, industrial enterprises produced goods worth 175.0 trillion soums, which was 7.7% higher compared to the same period of the previous year. Manufacturing industries accounted for the largest share, producing goods worth 146.8 trillion soums and constituting 83.8% of total industrial production.

These data indicate that significant structural changes have been implemented in the industrial sector in recent years, resulting in a considerable increase in the role of industry in the economy and in production potential. However, existing opportunities are still not fully utilized. In particular, outdated fixed assets, high production costs, excessive energy consumption, dependence on manual labor, insufficient deep processing of raw materials, shortage of qualified personnel, and weak quality competition with imported products negatively affect industrial development. Furthermore, the low level of efficient resource utilization and the insufficient introduction of modern technologies continue to limit production efficiency. According to available data, the share of high-tech industries in manufacturing currently accounts for only 1.1%, medium-high-tech industries 18.5%, medium-low-tech industries 46.6%, and low-tech industries 33.8%.

Investment resources play an important economic role in the modernization of industrial sectors. They ensure the efficiency of industrial enterprises through the expansion of production capacities, renewal of fixed assets, and improvement of technological levels. According to statistical data, investments in fixed capital in Uzbekistan demonstrated stable growth during 2020–2025. In



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particular, investment volume amounted to nearly 141 trillion soums in 2020, while by 2025 this figure reached 591.1 trillion soums, which was 10.5% higher than in 2024. This situation indicates a high level of investment activity in the national economy and the expansion of financial resources necessary for industrial modernization.

However, the share of funds allocated to the introduction of modern innovative technologies remains relatively low, and most investment resources are directed toward expanding traditional production capacities. As a result, the effectiveness of these investments is not as high as expected. This situation necessitates the improvement of investment policy in the modernization of industrial sectors and the orientation of resources toward innovative and technological development. The introduction of digital technologies in the modernization of industrial sectors — including automation of production processes, transition to digital management systems, and the use of artificial intelligence and big data — significantly increases enterprise efficiency. Digital technologies optimize production processes, reduce the human factor, minimize errors, and ensure the efficient use of resources. As a result, production costs decrease, product quality improves, and the competitiveness of enterprises strengthens.

### **Conclusion**

The above considerations demonstrate that resource use efficiency is a complex, multifaceted, and dynamic concept, and that substantial improvements in efficiency can only be achieved through the integrated influence of various factors. In order to improve efficiency in industrial enterprises, it is advisable to implement the following measures:

- replacing outdated machinery and equipment with modern energy-saving technologies;
- identifying new types of energy, raw materials, and materials and rapidly introducing them into production;
- reducing production costs and improving product quality through the wide implementation of scientific and technological achievements and innovative technologies;
- strengthening the rational use of local raw materials and resources;



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- fully developing production chains for high value-added finished products;
  - ensuring rational use of raw materials, implementing waste-free technologies, and increasing the level of raw material processing;
  - training, retraining, and continuously improving the qualifications of skilled personnel with modern knowledge and competencies required for new industrial sectors and digitalization processes;
  - increasing labor productivity by strengthening systems of material and moral incentives for employees;
  - introducing modern management methods in industrial enterprises, such as Kaizen and Lean Production;
  - improving product quality in accordance with international standards and expanding the production of export-oriented goods in order to enhance the competitiveness of industrial enterprises.

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