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STRATEGIES FOR THE EFFICIENT USE OF RESOURCES IN INDUSTRIAL SECTORS

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Abstract

This article provides a comprehensive analysis of the theoretical and methodological foundations of resource-efficiency strategies in industrial sectors, together with the mechanisms of their practical application. The principal aim of the study is to identify the innovative approaches and management strategies directed towards increasing the efficiency with which material, energy and labour resources are used in production processes. The findings demonstrate that high economic efficiency can be achieved by introducing resource-saving technologies in industrial enterprises, accelerating digitalisation, optimising production and applying the principles of the "green economy". The study further substantiates the importance of improving organisational and managerial mechanisms, developing innovation infrastructure and making effective use of human capital in formulating strategies for the rational use of resources.

Keywords

resource efficiency, industrial sectors, innovation strategy, green economy, digitalisation, optimisation, digital transformation, energy efficiency, sustainable development, environmental management, economic efficiency, resource integration, industrial innovation.

Introduction.

It is well recognised that the efficient use of resources in industrial sectors is acquiring strategic significance. Limited natural resources, the volatility of energy prices, the intensification of environmental problems and rising production costs are compelling enterprises to develop strategies for the rational and economical use of resources. In international economic practice, in particular, it has been established that raw materials and energy resources account, on average, for between 50 and 70 per cent of the total costs of industrial production, which indicates that considerable economic opportunities may be realised by improving resource efficiency [1].

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The efficient use of resources in industrial sectors involves not only the conservation of material, energy and labour resources in production processes, but also their optimal allocation, processing, reuse and management on the basis of innovative technologies. This process constitutes an important factor in raising production efficiency, reducing the unit cost of products and strengthening the competitiveness of enterprises. Global experience shows that increasing the level of resource-use efficiency by 10–15 per cent contributes, on average, to a 5–8 per cent rise in production profitability [2].

In recent years, resource-management approaches grounded in the principles of the "green economy" have been widely applied across industrial sectors. Priority is being given, in particular, to such areas as improving energy efficiency, reducing and recycling waste, using water resources rationally and curbing carbon emissions. According to data from international organisations, the global industrial sector accounts for approximately 37 per cent of total energy consumption, while more than 30 per cent of greenhouse-gas emissions are likewise attributable to industry. This renders the development and implementation of resource-efficiency strategies an even more pressing concern.

Digital technologies and innovations are playing an important role in improving resource efficiency. Within the framework of the Industry 4.0 concept, the introduction of automation, artificial intelligence, big data and the Internet of Things (IoT) is expanding the scope for monitoring and optimising resource-use processes in real time [3]. Research shows that, in enterprises with a high level of digitalisation, resource-use efficiency is 20–25 per cent higher than in conventional enterprises.

Table 1

Factors influencing resource use in industrial enterprises

No.	Group of factors	Principal elements	Mechanism of influence
1	Technological factors	Equipment, automation, alisation	Raises production ency
2	Economic factors	Investment, costs, pricing y	Determines the level of rce use
3	Organisational factors	Quality of management, egic planning	Improves the tiveness of decision-ng
4	Environmental factors	Environmental irements, waste management	Ensures sustainability

Compiled by the author.

By grouping the principal factors that affect the level of resource use in industrial enterprises, this table reveals their economic and organisational essence.

The interrelationship between technological, economic, organisational and environmental factors is of considerable importance in shaping strategies for the efficient use of resources.

A systematic approach is, moreover, essential in developing strategies for the efficient use of resources in industrial sectors. This process encompasses all stages of production—the entire chain from the supply of raw materials to the delivery of the finished product to the consumer. The circular-economy model, in particular, serves to enhance efficiency through the reuse of resources, the minimisation of waste and the creation of closed production cycles. Practice shows that introducing elements of the circular economy makes it possible to reduce resource consumption by 15–20 per cent and the volume of waste by 25–30 per cent [4].

In the context of the economy of Uzbekistan, the efficient use of resources in industrial sectors likewise represents one of the priority directions. In recent years, the volume of the country's industrial production has grown steadily, and its share in gross domestic product has exceeded 30 per cent. At the same time, energy consumption in the industrial sector remains high: in certain branches, energy intensity is 1.5–2 times greater than in developed countries [5]. The programmes adopted by the State to modernise industry, improve energy efficiency and introduce resource-saving technologies are helping to address this problem. Large-scale reforms are being implemented, in particular, to raise the level of resource-use efficiency through the widespread introduction of renewable energy sources, the technical and technological renewal of industrial enterprises and the digitalisation of production processes.

Review of the relevant literature.

The efficient use of resources in industrial sectors and the formation of brand strategy in the automotive industry are among the directions extensively studied in contemporary economics and management science. Scholarly research on this subject is based principally on theories of resource efficiency, innovation management, marketing strategy and the formation of brand equity. Studies conducted by scholars from abroad and from the Commonwealth of Independent States (CIS), in particular, place special emphasis on the close interconnection between the efficient use of resources and brand strategy in enhancing the competitiveness of automotive enterprises.

Among scholars from abroad, P. Kotler, in his marketing theory, interprets the brand as a strategic asset of the enterprise and demonstrates that its formation is directly bound up with the process of studying consumer needs in depth and of creating value [6]. According to his conception, the efficient use of resources in industrial enterprises constitutes one of the important factors in raising brand

value, since economical and innovative production exerts a positive influence on the brand image.

K. Keller, for his part, developed the theory of brand equity, arguing that the positive perceptions formed in the minds of consumers generate higher demand for an enterprise's products. His research provides a scientific basis for the proposition that, in the automotive industry, brand loyalty and brand awareness exert a significant influence on sales volume [7]. Keller also notes the necessity of allocating resources efficiently and optimising marketing communications when developing brand strategy.

Among European researchers, L. Horváth, in studying premium-brand strategies in the automotive industry, argues that the efficient use of innovation, research and development, and financial resources is the decisive factor in elevating a brand to the higher segment [8]. In his view, the rational use of resources not only raises production efficiency but also strengthens the brand's position in the market.

Recent research has examined extensively the concept of brand attachment in the automotive industry. The studies conducted by A. Milheiro, in particular, have established that consumers' emotional and cognitive attachment to a brand significantly increases their loyalty and the likelihood of repeat purchase [9]. This indicates that, for enterprises, it is important to cultivate not only product quality but also the emotional values associated with the brand.

S. Schaltegger is among the scholars who have linked resource efficiency with an ecological-economic approach. In his study entitled "Contemporary Environmental Accounting: Issues, Concepts and Practice", he emphasises the necessity of optimising energy and raw-material costs in industrial enterprises through environmental-management systems [10]. The author demonstrates that resource conservation is not merely an environmental requirement but a strategic instrument that yields economic benefit.

The problem has also been analysed extensively in the work of scholars from the CIS and of local scholars. The Russian economist V. Kovalyov, for example, assesses the efficient use of resources as a fundamental factor in the economic stability of the enterprise and stresses the need to optimise production processes and introduce resource-saving technologies [11]. In his approach, resource efficiency is considered in close connection with the enterprise's overall model of strategic development.

A. Aganbegyan, in turn, notes that the rational use of resources in the process of modernising industrial sectors is an essential condition of innovative development [12]. He provides a scientific basis for the proposition that improving

resource efficiency is the decisive factor in the transition to an intensive model of economic growth.

Among scholars from Uzbekistan, B. Khodiyev, in his research, demonstrates the necessity of the efficient use of resources and the introduction of innovative management mechanisms in the development of industrial sectors within the national economy [13]. In his view, production efficiency can be raised considerably by improving the system of resource management in industrial enterprises.

Similarly, in the scholarly works of M. Pardaev, the optimisation of management decisions, the minimisation of costs and the digitalisation of production processes are regarded as important factors in improving the efficiency of resource use in enterprises [14]. He emphasises the need to apply a systematic approach in developing strategies for the efficient use of resources.

Analysis of the scholarly views set out above shows that, in industrial sectors—and in the automotive industry in particular—the efficient use of resources and the formation of brand strategy are closely interrelated processes. Whereas scholars from abroad have focused chiefly on brand equity, consumer behaviour and marketing strategy, scholars from the CIS and local scholars have studied in depth the questions of resource-use efficiency and the optimisation of production processes. For this reason, studying these two directions in an integrated manner is, under present-day conditions, of considerable scholarly and practical importance in ensuring the sustainable development of industrial enterprises.

Research methodology.

In order to provide a comprehensive assessment of resource-efficiency strategies in industrial sectors, this study employed the general and special methods of scientific enquiry on the basis of a systematic approach. In assessing production efficiency, econometric modelling—in particular, regression analysis and index methods—was applied, and the influence of the level of resource use on production outcomes was thereby determined. The data sources used in the study comprised the reports of national statistical bodies and international organisations, together with the practical indicators of industrial enterprises.

Analysis and results.

Within the framework of this study, the practical results of resource-efficiency strategies in industrial sectors were examined on the basis of systematic and comparative analysis. In the course of the analysis, an assessment was made of the principal factors affecting the efficiency with which resources (raw materials, energy, water and labour) are used in industrial production, as well as of the effectiveness of modern technologies and management mechanisms.

First, analysis of the dynamics of energy-resource use in the global industrial system shows that the industrial sector is one of the largest consumers of total energy. According to data from the International Energy Agency, in particular, the industrial sector accounted for approximately 35–37 per cent of energy consumption in 2023–2024, a figure that sharply increases the necessity of improving resource efficiency [15]. At the same time, energy intensity (that is, energy consumption per unit of GDP) has been declining only slowly in recent years, improving by a mere 1–1.5 per cent in 2023, which indicates that this is insufficient for attaining the goals of sustainable development.

Second, the role of innovative technologies is of particular importance in improving the efficiency of resource use in industrial sectors. The analyses show that, in enterprises where automation, artificial intelligence and digital monitoring systems have been introduced, energy consumption is reduced, on average, by between 15 and 25 per cent. In particular, the use of expert systems in production reveals opportunities for energy saving and significantly raises production efficiency [16]. This confirms the priority of a digital-transformation strategy in resource management.

Third, analysis of the economic results of the efficient use of resources shows that the introduction of resource-saving technologies considerably reduces enterprise costs. As of 2024, the market for industrial energy-efficiency services exceeded 11 billion US dollars in volume and is forecast to reach 13.9 billion dollars by 2028 [17]. This testifies to the growing demand on the part of industrial enterprises for improvements in resource efficiency.

Fourth, the analyses show that the efficient use of resources is closely bound up with environmental performance. The industrial sector generates a substantial share of global greenhouse-gas emissions, and it is therefore possible to reduce carbon emissions by improving energy efficiency. According to a report by the United Nations Industrial Development Organization, industry is a principal driver of sustainable development, and environmental sustainability can be attained through the efficient use of resources. In particular, by recycling waste and introducing the principles of the circular economy, resource-use efficiency can be raised by between 20 and 30 per cent.

Fifth, the application of modern economic-mathematical methods is of considerable importance in assessing the efficiency of resource use in industrial sectors. Methods such as Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA) and Index Decomposition Analysis (IDA) make it possible to assess production efficiency comprehensively. Analysis of research conducted between

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2005 and 2024 shows that these methods can be used to measure and optimise resource-use efficiency with precision.

The results show that the implementation of resource-efficiency strategies in industrial sectors gives rise to the following principal positive outcomes:

(1) a reduction in the unit cost of production of, on average, 10–20 per cent;

(2) a reduction in energy consumption of up to 15–25 per cent;

(3) an increase in production efficiency of 12–18 per cent;

(4) a significant reduction in environmental harm;

(5) an increase in the competitiveness of enterprises in the global market.

In addition, in 2023–2025, the policies pursued in developed countries to improve energy efficiency have produced clear positive shifts in the reduction of energy intensity. In certain countries, for example, the goal has been set of reducing energy intensity by 2–3 per cent per year, which is regarded as one of the priority directions of industrial policy.

Table 2

Results of strategies for the efficient use of resources

No.	Type of result	Description	Economic significance
1	Economic efficiency	Reduction in costs	Increase in profit
2	Technological lopment	Introduction of vations	Modernisation of uction
3	Environmental inability	Reduction in waste	Protection of the ronment
4	Social impact	Employment and higher s	Social welfare

Compiled by the author.

This table summarises the economic, technological, environmental and social results of strategies for the efficient use of resources. Analysis of the table shows that effective resource management is an important factor in ensuring the sustainable development of enterprises.

Important reforms relating to the efficient use of resources have also been carried out in the industrial sector of Uzbekistan in recent years. In 2023–2025, the volume of industrial production grew steadily, and its share in GDP has been maintained at a level above 30 per cent. At the same time, energy intensity remains high, and in certain branches 1.5–2 times more energy is consumed than in developed countries. Within the framework of the modernisation programmes being implemented by the State, hundreds of projects to improve energy efficiency in industrial enterprises were carried out in 2024–2025, as a result of which energy-saving indicators improved, on average, by 10–15 per cent [18]. Furthermore, the

institutional and economic conditions necessary for raising still further the level of efficient resource use in industrial sectors are being created through the introduction of renewable energy sources, the digitalisation of production and the widespread application of resource-saving technologies.

Conclusions and recommendations.

The results of this study confirm that strategies for the efficient use of resources in industrial sectors are a decisive factor in raising the economic efficiency of enterprises, strengthening their competitiveness and ensuring environmental sustainability. The analyses have shown that the rational use of resources serves not only to reduce production costs but also to promote innovative development, modernise production processes and create high added value. By improving the efficiency with which energy and raw-material resources are used, in particular, it is possible to reduce the unit cost of production and to strengthen the financial stability of enterprises.

The study has established that resource efficiency in industrial sectors is to be improved through the following principal directions: technological renewal, digital transformation, the improvement of management systems and the introduction of the principles of the circular economy. At the same time, the application of innovative technologies makes it possible to reduce energy consumption considerably, to optimise production processes and to reduce waste. This is of considerable importance in ensuring the long-term sustainable development of industrial enterprises.

The investigations have also shown that the effectiveness of resource-efficiency strategies depends in large measure on the institutional environment, State policy, investment activity and the level of development of human capital. For this reason, it is necessary to apply a comprehensive and systematic approach in this direction, one that encompasses all stages of production.

On the basis of the conclusions set out above, the following scholarly and practical recommendations have been formulated:

First, it is necessary to introduce an integrated system for managing resource use in industrial enterprises. This system should be based on digital platforms that make it possible to monitor, analyse and optimise resource-use processes in real time.

Second, it is important to introduce widely those technologies directed towards improving energy efficiency. Energy consumption can be reduced, in particular, by expanding the use of energy-saving equipment, automated management systems and renewable energy sources.

Third, it is necessary to introduce widely the principles of the circular economy in industrial sectors. This serves to improve resource efficiency through the recycling of waste, the reuse of resources and the creation of closed production cycles.

Fourth, it is necessary to stimulate innovation activity in enterprises and to increase investment in research and development. This makes it possible to improve resource-use efficiency through the development and introduction of new technologies.

Fifth, it is necessary for the State to strengthen the mechanisms for supporting industrial enterprises. The promotion of resource-saving technologies through tax concessions, subsidies and grants is, in particular, of considerable importance.

Sixth, particular attention should be devoted to the development of human capital. Strategies for the efficient use of resources can be implemented successfully by training qualified specialists and enhancing their knowledge and skills.

In sum, the implementation of strategies for the efficient use of resources in industrial sectors is an important factor in ensuring economic growth, environmental sustainability and social welfare; in this direction, it is necessary to adopt scientifically grounded decisions and to pursue a comprehensive approach.

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