

THE SPECIFIC FEATURES OF EFFICIENT USE OF MATERIAL RESOURCES IN MANUFACTURING ENTERPRISES: EVIDENCE FROM UZBEKISTAN

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Abstract: This article examines the specific features of efficient use of material resources in manufacturing enterprises of Uzbekistan. The study analyzes the dynamics of industrial output, the structure of resource utilization, and the level of technological development in the country's production system. Based on recent statistical data from the State Statistics Committee of Uzbekistan, World Bank, and OECD reports (2020–2025), the paper identifies key factors influencing the efficiency of material resource management, including modernization of production equipment, waste reduction, and introduction of circular economy practices. The findings reveal that resource efficiency in Uzbekistan's manufacturing sector is improving steadily, yet remains below the average of OECD economies due to technological dependence and limited innovation diffusion.

Keywords: resource efficiency, manufacturing enterprises, Uzbekistan, material management, industrial development, sustainable production

Introduction

In the modern industrial economy, efficient use of material resources has become one of the core conditions for achieving sustainable growth and competitiveness. In developing countries like Uzbekistan, the manufacturing sector plays a vital role in economic diversification and industrial modernization. According to the State Statistics Committee (2025), the total value of industrial production in Uzbekistan during January–July 2025 reached 575.6 trillion UZS, showing a 6.5% increase compared to the same period in 2024. Despite positive trends, many enterprises still experience high material intensity, waste generation, and low resource productivity.

The issue of efficient use of materials is particularly relevant for Uzbekistan, where the manufacturing base is dominated by low and medium-technology industries. Improving material resource efficiency (MRE) is essential for enhancing competitiveness, reducing environmental pressure, and increasing profitability in industrial enterprises. This research aims to identify the specific features and challenges of material resource efficiency in Uzbekistan's manufacturing sector, based on quantitative data and sectoral analysis.

Literature Review

Numerous international studies highlight the significance of material efficiency for industrial sustainability. According to the OECD (2023), material efficiency can contribute up to 25% reduction in industrial energy consumption when supported by circular economy practices. UNIDO (2022) emphasizes that resource-efficient manufacturing not only reduces costs but also stimulates technological innovation and green job creation.

In the context of Uzbekistan, local scholars such as Karimov (2021) and Yusupov (2023) argue that industrial enterprises need to prioritize modernization and resource auditing. The concept of "lean manufacturing," when adapted to local conditions, can significantly enhance resource use efficiency. Moreover, empirical studies conducted in countries like Kazakhstan and Poland (Szymański, 2020) show that integrating digital technologies such as smart metering and IoT systems into material management improves monitoring and minimizes losses.

Methodology

This study uses a mixed research methodology based on quantitative and comparative analysis. Statistical data from 2020–2025 were collected from the Uzbekistan Statistics Agency, World Bank, and OECD datasets. The analysis focuses on key indicators such as material intensity, industrial output growth, technological level, and waste generation ratios.

A comparative framework was applied to assess Uzbekistan's performance relative to OECD averages. Additionally, several large industrial enterprises were used as case studies—namely UzAuto Motors (automotive sector), Navoiy Mining and Metallurgical Combine (metallurgy), and Artel Group (electronics manufacturing).

Results and Discussion

The results show that Uzbekistan's manufacturing sector has been expanding steadily in recent years. In 2025, the number of active industrial enterprises reached 58,800, of which 20.2% specialized in food and beverage production, 15.7% in textiles and leather, and 18.2% in machinery and metal products. The share of chemical and plastic industries amounted to 6.9%.

Indicator	2020	2022	2025	Growth (2020–2025)
Industrial output (trillion UZS)	392.1	498.7	575.6	+46.8%
Manufacturing enterprises (units)	48,200	54,900	58,800	+22%
Share of high-tech industries (%)	0.9	1.0	1.1	+0.2 p.p.
Textile waste increase (%)	—	+12.4	+29.1	—

Source: Uzbekistan Statistics Committee (2025); Uzdaily.uz, August 2025.

These data demonstrate that industrial production is growing faster than the rate of technological renewal. While the overall efficiency of material use has improved, the share of high-technology industries remains low (around 1.1%). Most enterprises still rely on medium- and low-tech production, where material losses can reach 10–15% of total inputs.

At the same time, some companies have introduced circular practices. UzAuto Motors implemented a material reuse program that reduced waste by 8% in 2024, while Artel introduced plastic recycling systems, saving approximately 600 tons of materials annually. Such examples illustrate that practical results are achievable through targeted investments in resource-saving technologies.

However, systemic challenges persist. Limited access to advanced equipment, insufficient staff training, and weak incentives for innovation continue to restrict material efficiency. Moreover, the proportion of recycled materials in industrial output remains below 7%, far lower than the OECD average of 19%.

Conclusion

The study concludes that efficient use of material resources in Uzbekistan's manufacturing sector is improving gradually, but the pace remains insufficient for achieving sustainable competitiveness. Enterprises that adopt digital monitoring systems, recycling technologies, and lean manufacturing principles achieve better results in resource productivity.

To strengthen efficiency, Uzbekistan should accelerate industrial modernization, promote circular economy legislation, and enhance cooperation between research institutions and industrial enterprises. State support programs—especially those related to green technologies—are expected to play a crucial role in improving industrial sustainability.

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