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Trends and Analysis of Factors in the Development of Uzbekistan's Chemical Industry

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Abstract: This article examines the major trends and determinants shaping the development of Uzbekistan's chemical industry. Particular attention is paid to industrial modernization, investment activity, export diversification, the availability of natural resources, energy efficiency, technological innovation, and environmental sustainability. The study applies descriptive statistical analysis, comparative assessment, and a systematic approach to identify the industry's main development opportunities and constraints. Official investment-sector information indicates that chemical production in Uzbekistan more than doubled in value terms between 2017 and 2025, while chemical-product exports exceeded USD 1.7 billion in 2025. Nevertheless, the sector faces challenges related to imported chemical products, energy intensity, limited domestic production of certain high-value-added chemicals, and environmental pressures. The article argues that long-term competitiveness depends on moving from traditional fertilizer production towards diversified chemical products, advanced materials, resource-efficient technologies, and stronger research-industry cooperation.

Keywords: Chemical industry, Uzbekistan, industrial development, investment, chemical production, exports, technological modernization, energy efficiency, sustainable development.

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1. Introduction

The chemical industry plays a strategically important role in the industrial development of Uzbekistan. Its products support agriculture, construction, textiles, mining, automotive manufacturing, and other sectors of the economy [1]. Mineral fertilizers, polymers, inorganic chemicals, industrial reagents, and synthetic materials are particularly important for strengthening domestic production chains and reducing dependence on imported intermediate goods [2].

In recent years, Uzbekistan has pursued industrial modernization through investment projects, the introduction of new production capacities, and the expansion of higher-value-added manufacturing [3]. According to Invest Uzbekistan, the value of chemical production more than doubled between 2017 and 2025 [4]. Chemical-product exports exceeded USD 1.7 billion in 2025, indicating the sector's growing role in export diversification [5].

However, growth in nominal production value does not necessarily indicate a proportional increase in physical output, labor productivity, or technological efficiency [6]. Rising production costs and changes in prices must therefore be distinguished from genuine improvements in industrial performance [7].

The purpose of this study is to identify the principal trends in Uzbekistan's chemical industry and analyze the economic, technological, institutional, and environmental factors

influencing its development. The article also proposes practical directions for improving the sector's competitiveness and sustainability.

International research on industrial development emphasizes that a country's competitiveness depends not only on the availability of natural resources but also on its ability to process them efficiently, develop technological capabilities, and produce goods with higher added value [8], [9]. These principles are particularly relevant to chemical manufacturing, where energy consumption, research and development, economies of scale, and environmental regulation influence production costs [10], [11].

The World Bank's analysis of Uzbekistan's long-term low-carbon development identifies the chemical industry as an important component of manufacturing and highlights its substantial demand for natural gas and electricity [12]. It also identifies mineral fertilizers as a major part of the sector's production structure.

The U.S. International Trade Administration's country commercial guide discusses opportunities in fertilizer production, petrochemicals, polymers, and industrial chemicals [5]. It also emphasizes investment and the expansion of domestic processing capacity as mechanisms for increasing value added.

Recent government initiatives place greater emphasis on investment projects, product diversification, digital management, cost reduction, and the utilization of industrial waste. In March 2026, Uzbekistan's presidential administration reported plans for 133 chemical-industry projects valued at USD 9.5 billion, with USD 2.5 billion in investment targeted for the year [13].

According to OECD guidelines on eco-innovation and sustainable manufacturing, long-term industrial viability requires balancing economic growth with resource efficiency and carbon abatement [14]. Furthermore, UNIDO frameworks stress that structural transformation in transition economies relies on establishing higher technological readiness and integration into global value chains [15].

Despite these developments, a key analytical issue remains: expanding production capacity alone does not guarantee improved competitiveness. The economic results of investment depend on capacity utilization, access to markets, technological efficiency, workforce skills, and the ability to develop products that can compete with imports.

2. Research Methodology

The study uses a descriptive and comparative approach to examine the development of Uzbekistan's chemical industry. The analysis draws on publicly available information from Invest Uzbekistan, the U.S. International Trade Administration, the World Bank, and official government publications.

The following methods are applied:

- Trend analysis to identify changes in the scale and direction of industrial development.
- Comparative analysis to assess the relationship between production expansion, exports, and imports.
- Factor analysis to classify the main drivers and constraints affecting industrial performance.
- Systematic analysis to examine links among investment, technological modernization, production costs, environmental performance, and export competitiveness.

The study is based on secondary data rather than an original econometric model. Accordingly, it identifies development patterns and plausible relationships but does not claim to establish statistically causal effects between individual factors and industrial growth.

3. Results and Discussion

One of the most significant trends is the expansion of domestic chemical production beyond its traditional focus on mineral fertilizers. Uzbekistan continues to produce nitrogen, phosphorus, and potassium fertilizers, while production and investment initiatives increasingly cover polymers, plastics, industrial reagents, soda products, and other chemicals.

Official investment-sector information reports chemical production valued at approximately USD 3.3 billion in 2025. The same source reports around USD 1.5 billion in rubber and plastic production, although these categories should be interpreted according to the source's industrial classification and not automatically added together.

A second trend is the expansion of investment. Investment projects can increase production capacity, modernize equipment, improve product quality, and enable the manufacture of chemicals previously sourced from abroad. Their effectiveness, however, depends on implementation schedules, access to raw materials, energy costs, and market demand.

A third trend is the increasing importance of export diversification. Chemical products can contribute to export growth by supplying neighboring markets and supporting regional industrial value chains. Nevertheless, a growing export value does not by itself demonstrate that the sector has become more competitive across all product categories.

Table 1. Selected indicators of Uzbekistan's chemical industry development

Indicator	Reported value	Period	Analytical significance
Chemical production value	Approximately USD 3.3 billion	2025	Indicates the scale of the sector
Rubber and plastic production value	Approximately USD 1.5 billion	2025	Demonstrates the importance of polymer-related manufacturing
Chemical-product exports	More than USD 1.7 billion	2025	Reflects the sector's export contribution
Chemical production growth in value terms	More than doubled	2017–2025	Shows long-term expansion in nominal value
Planned chemical-industry investment	USD 2.5 billion	2026 target	Indicates the scale of planned investment activity
Investment projects announced	133 projects worth USD 9.5 billion	2026 programme	Shows the prospective scale of industrial modernization

The table indicates that Uzbekistan's chemical industry is expanding in both production scale and investment ambition. However, the indicators represent different dimensions of development: production and exports are reported economic outcomes, whereas the 2026 investment figures describe plans. Their comparison should therefore be used to assess strategic direction rather than to infer that planned investment has already generated additional output.

1. Raw-material availability. Uzbekistan's access to natural gas, limestone, and phosphate resources creates a basis for fertilizer production and several branches of chemical processing. The economic benefit depends on whether raw materials are processed domestically into competitive products rather than sold or used in relatively low-value production stages.

2. Investment and access to finance. Modern chemical plants require substantial capital expenditure, specialized equipment, and long implementation periods. Foreign direct investment and long-term financing can help enterprises adopt modern technologies, but investment projects must be assessed by their expected productivity, operational costs, market demand, and environmental impact.

3. Energy efficiency. Chemical production can be highly energy-intensive. Natural gas may serve both as a feedstock and as a source of energy, making production costs sensitive to energy prices and equipment efficiency. Modernizing production processes, reducing material losses, and improving energy management can strengthen competitiveness.

4. Technological modernization and innovation. Digital process control, predictive maintenance, improved catalysts, advanced materials, and more efficient production technologies can reduce downtime and improve product quality. Uzbekistan's announced initiatives include digital management systems and plans to strengthen research infrastructure in chemical technology.

5. Export markets and import competition. Export expansion provides opportunities to increase production volumes and diversify foreign-exchange earnings. At the same time, substantial imports of chemical products indicate that domestic producers do not yet fully satisfy demand across all product categories. In 2024, Uzbekistan's chemical-product imports were reported at approximately USD 4.688 billion, compared with exports of USD 1.687 billion under the U.S. International Trade Administration's market definition.

6. Human capital and research capacity. Chemical manufacturing requires engineers, process technologists, laboratory specialists, environmental experts, and skilled operators. Cooperation between enterprises, universities, and research institutions can help adapt technologies to local conditions and increase the domestic content of industrial innovation.

7. Environmental sustainability. Chemical enterprises must manage emissions, wastewater, solid waste, and resource consumption. Waste recovery, cleaner production processes, water recycling, and improved pollution monitoring can reduce environmental pressures while creating opportunities to recover commercially valuable materials. The industry's own published information describes initiatives to reuse phosphogypsum in products such as sulfuric acid and cement.

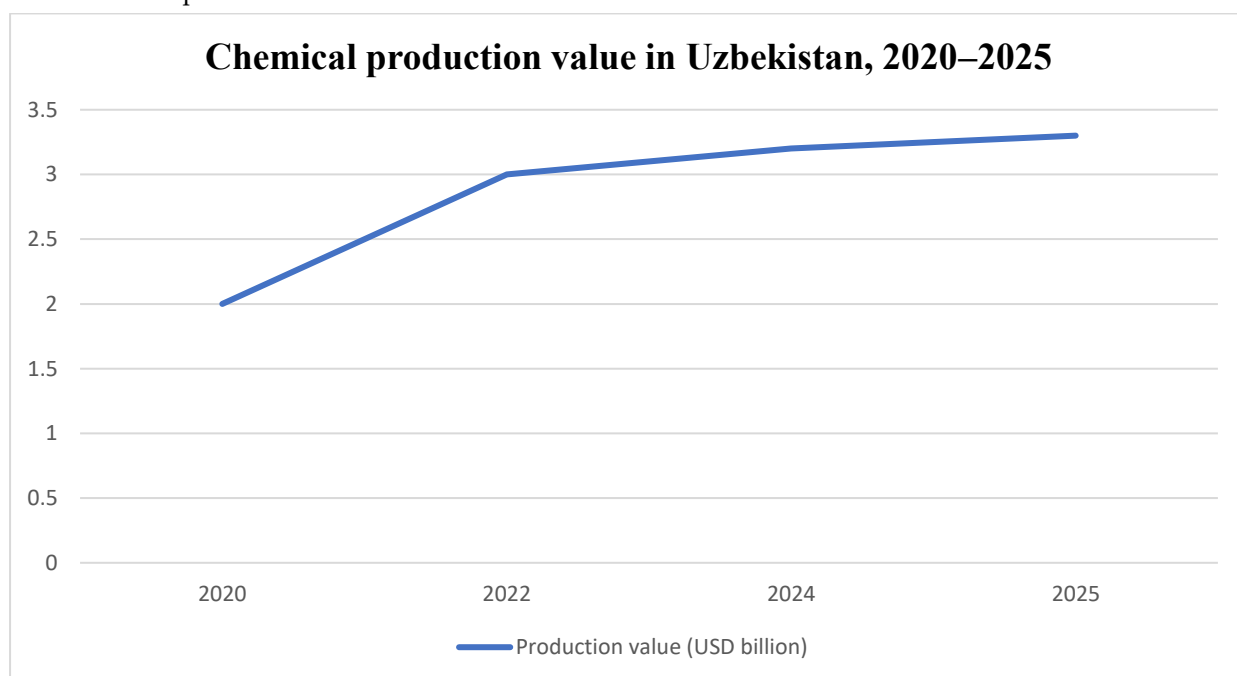


Figure 1. Chemical production value in Uzbekistan, 2020–2025

The data show a substantial increase in reported production value between 2020 and 2025. The rise from USD 2.0 billion to USD 3.3 billion represents an increase of approximately 65%. This trend is consistent with expanding production capacity and investment activity. Nevertheless, the figures are expressed in monetary terms, so they

cannot independently establish the rate of real output growth without information on price changes and industrial production volumes.

To identify potential priorities for industrial policy, the following pie-chart structure can be used. These percentages represent an illustrative analytical allocation proposed for this article, not an official government budget, observed investment distribution, or survey result.

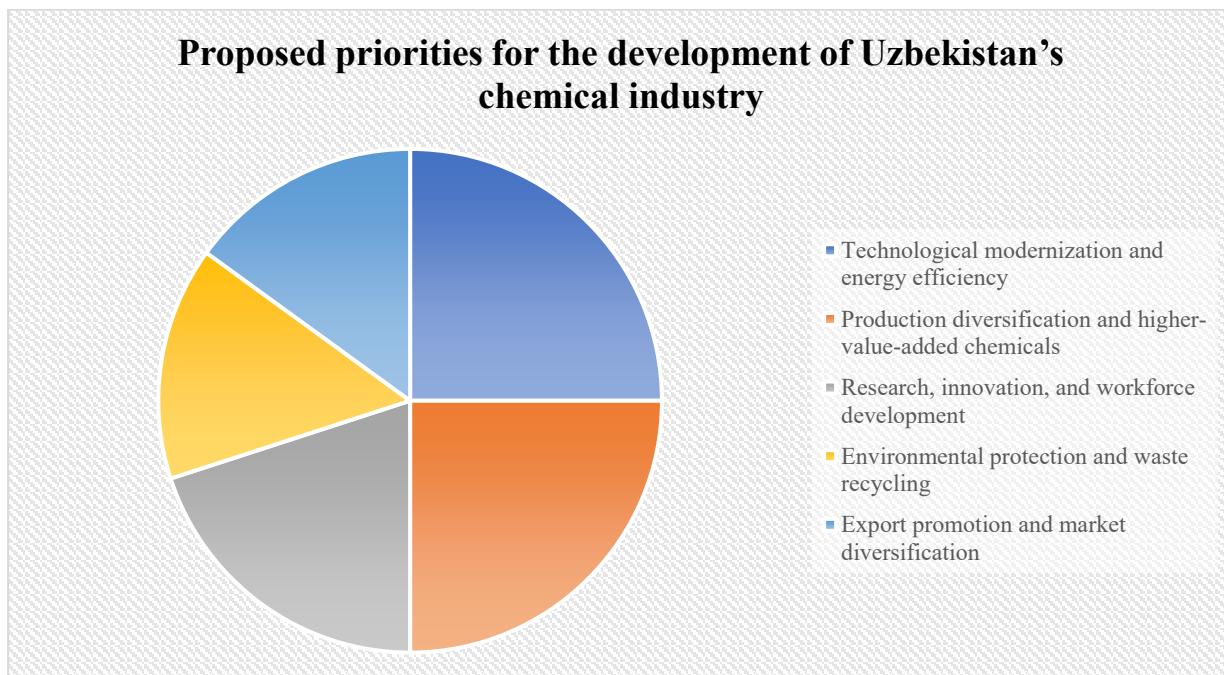


Figure 2. Proposed priorities for the development of Uzbekistan's chemical industry

The proposed distribution gives equal priority to technological modernization and product diversification because both directly affect production costs and the sector's position in domestic and international markets. Research and workforce development support the adoption of advanced processes, while environmental management and export diversification help ensure that industrial expansion remains sustainable and commercially viable. The proportions should be validated through enterprise surveys, expert assessment, or an analysis of actual investment allocations before being presented as empirical findings.

The analysis suggests five interconnected directions for the further development of Uzbekistan's chemical industry.

First, the sector should accelerate the transition from basic chemical production towards products with higher added value. Expanding the domestic production of polymers, specialty chemicals, catalysts, reagents, and industrial additives can strengthen linkages with textiles, construction, mining, agriculture, and manufacturing.

Second, investment projects should be evaluated according to operational performance, not solely according to the amount of capital invested or the capacity announced. Key indicators should include capacity utilization, energy consumption per unit of output, labor productivity, product quality, export revenue, and the proportion of locally processed raw materials.

Third, enterprises should improve energy and resource efficiency. Modern equipment, digital monitoring, preventive maintenance, and better control of production processes can help reduce operating costs. These measures are particularly important in production processes that rely heavily on natural gas and electricity.

Fourth, industrial policy should support closer cooperation between universities, research centers, and chemical enterprises. Joint laboratories, applied research projects,

professional training, and technology transfer can improve the sector's ability to develop products suited to local industrial needs.

Fifth, environmental performance should be integrated into investment decisions.

The recovery of industrial by-products, recycling of process water, improved wastewater treatment, and monitoring of emissions can reduce environmental risks and encourage the adoption of cleaner production methods.

These directions should be implemented as a coordinated strategy. Product diversification without reliable technology may increase costs, while modernization without market development may leave new capacity underutilized. The strongest results are likely to emerge when investment, innovation, export development, workforce skills, and environmental management reinforce one another.

4. Conclusion

The development of Uzbekistan's chemical industry is characterized by expanding production value, investment activity, and a gradual diversification of manufactured products. The industry's resource base and its links with agriculture and manufacturing provide significant opportunities for further industrial growth. At the same time, the sector's future competitiveness depends on addressing energy intensity, import dependence in selected product categories, technological constraints, and environmental challenges.

The analysis leads to the following conclusions:

1. Production expansion should be accompanied by productivity growth. Increases in nominal production value need to be assessed alongside physical output, labor productivity, and unit production costs.

2. Diversification is essential for increasing added value. Expanding the production of polymers, specialty chemicals, industrial reagents, and advanced materials can strengthen domestic supply chains and create new export opportunities.

3. Investment effectiveness matters as much as investment volume. Projects should be monitored through indicators such as capacity utilization, energy efficiency, production costs, and export performance.

4. Innovation and human capital are key long-term determinants. Cooperation between industrial enterprises, universities, and research centers can improve technological capabilities and support the introduction of competitive products.

5. Environmental sustainability should be integrated into industrial modernization. Resource recycling, energy-efficient technologies, and stronger environmental monitoring can help reduce the ecological impact of production.

Overall, Uzbekistan's chemical industry has the potential to become a more diversified and technologically advanced component of the national economy. Achieving this objective requires a shift from a predominantly capacity-expansion approach towards a model based on productivity, innovation, higher value added, export competitiveness, and resource efficiency.

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