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Industrial Structure and Structural Constraints on Industrial Upgrading in Uzbekistan: Lessons from South Korea

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ABSTRACT

Despite sustained economic growth and market-oriented reforms since 2017, Uzbekistan has yet to achieve substantial industrial upgrading. This study examines the country's industrial structure across five dimensions — industrial composition, technological capabilities, ownership patterns, export specialization, and financial development — using official national statistics and international databases for 2015-2025, and draws comparative lessons from South Korea's industrial transformation. The analysis shows that industrial expansion continues to rely heavily on the energy-mining-metallurgy complex, which remains the principal source of exports, investment, and fiscal revenues. Low- and medium-low-technology industries still account for roughly three-quarters of manufacturing output, and the share of medium- and high-technology industries in manufacturing value added (about 18%) remains far below that of the leading industrializing economies of Asia. Weak domestic value chains, the continued dominance of state-owned enterprises, limited access to long-term finance for private firms, very low research and development spending (0.13% of GDP), and underdeveloped capital markets have constrained productivity growth and slowed industrial diversification. These findings suggest that sustainable industrial transformation cannot be achieved through resource-based growth alone. Long-term industrial development will depend on strengthening technological capabilities, fostering a more competitive private sector, deepening capital markets, and integrating more effectively into regional and global value chains. South Korea's experience indicates that the decisive factor is not the replication of a particular model but the consistent linking of state support to measurable performance, technological learning, and international competitiveness.

Keywords: Industrial Structure, Industrial Upgrading, Technological Intensity, State-Owned Enterprises, Access to Finance, Export Diversification
JEL Classifications: L16, N1, 014

1. INTRODUCTION

Differences in industrial structure help explain why countries with broadly similar income levels often experience very different development outcomes. For late-industrializing economies, the key issue is not simply the scale of manufacturing but the way industrial activity is organized. Sectoral specialization, ownership arrangements, technological capability, and participation in regional and global value chains all shape productivity growth, influence the diffusion of new technologies, and affect an economy's ability to withstand external shocks.

Uzbekistan offers a useful example of these dynamics. As the most populous country in Central Asia, with more than 38 million inhabitants, it inherited an industrial system built to serve the needs of the Soviet centrally planned economy rather than those of an independent market economy (Pomfret, 2019). Much of that industrial base remained intact after independence, particularly in energy, mining, and metallurgy. While these sectors have provided an important foundation for industrial production and export earnings, they have also reinforced patterns of specialization that are not easily transformed.

Industrial policy has changed considerably over the past decade. Since the launch of market-oriented reforms in 2017, the government has sought to modernize manufacturing, diversify exports, and expand the role of private enterprise. These efforts have attracted investment and stimulated industrial growth in a

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number of sectors. Even so, the broader structure of the economy has proved far more resistant to change than headline growth figures suggest. State-owned enterprises continue to dominate many strategic industries, technological upgrading has progressed unevenly, and coordination across industrial, financial, and innovation policies remains fragmented (European Bank for Reconstruction and Development [EBRD], 2023; World Bank, 2025c). Together, these factors have limited the speed of structural transformation.

This raises a broader question about Uzbekistan's development trajectory: why has the energy-mining-metallurgy complex remained at the center of the country's industrial economy despite several years of market-oriented reform? Addressing this question requires looking beyond growth rates alone. Accordingly, this study examines Uzbekistan's industrial composition, technological capabilities, ownership structure, export specialization, and financial system in order to identify the structural constraints that continue to hinder industrial upgrading. It also considers how South Korea's experience of industrial transformation may offer practical lessons for Uzbekistan as it seeks to build a more diversified and technologically advanced industrial economy.

The remainder of the paper is organized as follows. The next section reviews the relevant literature, followed by a description of the research methodology. The analysis and results section examine the main structural dimensions of Uzbekistan's industry together with the South Korean experience, and the final section presents conclusions and policy recommendations.

2. LITERATURE REVIEW

Industrialization has long been recognized as a major driver of economic development and structural transformation. Classical development economists such as Lewis (1954) and Kuznets (1966) argued that sustained economic growth depends on the reallocation of labor and capital from low-productivity activities to higher-productivity sectors, above all manufacturing. More recent research further emphasizes that industrial development requires not only the expansion of manufacturing output but also the upgrading of technological capabilities and industrial sophistication (UNIDO, 2024).

Manufacturing is widely regarded as an important source of productivity growth and technological progress. Although both Szirmai (2012) and Rodrik (2013) view manufacturing as a principal engine of growth, Szirmai places greater emphasis on technological learning and economies of scale, whereas Rodrik highlights the tendency of manufacturing industries to converge unconditionally toward the global productivity frontier. Research on export composition reaches similar conclusions: countries whose manufacturing and exports are concentrated in more technologically sophisticated products tend to achieve stronger competitiveness and faster long-term growth (Lall, 2000; Hausmann et al., 2007).

The literature also stresses the importance of industrial upgrading and diversification. Lin (2012) argues that industrial development should follow an economy's evolving comparative advantage and be facilitated by appropriate government policies and institutions, whereas Auty (1993) and Sachs and Warner (2001) show that heavy dependence on natural resources often constrains diversification and technological progress. Other studies emphasize that efficient financial systems, industrial clusters, participation in global value chains, and balanced public-private sector development are essential for enhancing industrial competitiveness (UNIDO, 2024; World Bank, 2025c).

A large body of research on East Asian industrialization, and on South Korea in particular, highlights the role of an active developmental state combined with strong market discipline. Amsden (1989) shows that Korean industrial policy provided subsidies and preferential credit in exchange for strict performance standards, especially export targets. Kim (1997) describes how Korean firms moved from imitation to innovation through deliberate investment in technological learning, while Lee (2013) argues that Korea's catch-up was facilitated by a gradual shift into technologies with short cycle times, which allowed latecomers to enter new industries without competing head-on with established incumbents.

Since the market-oriented reforms launched in 2017, Uzbekistan has received growing attention from researchers and international organizations. Studies by the World Bank (2019, 2025c), the Asian Development Bank (2024), the International Monetary Fund (IMF, 2024), and the OECD (2019) primarily examine economic liberalization, privatization, and private-sector development. However, relatively few studies provide a comprehensive assessment of Uzbekistan's industrial structure that integrates technological capabilities, ownership structure, export specialization, financial development, and industrial competitiveness. This study seeks to address this gap by examining these structural dimensions within a unified analytical framework and by drawing lessons from South Korea's industrial transformation.

3. RESEARCH METHODOLOGY

This study adopts a descriptive-analytical and comparative research design. The analysis is organized around five interrelated dimensions of industrial structure: (1) The sectoral composition of industry and enterprise dynamics; (2) The technological intensity of manufacturing; (3) The ownership structure and the balance between state-owned and private enterprises, including small and medium-sized enterprises (SMEs); (4) Export specialization; and (5) The development of the financial and innovation systems that support industrial upgrading.

The empirical analysis is based on secondary data. National data were obtained from the Statistics Agency under the President of the Republic of Uzbekistan, including business demography, industrial production, small business, and foreign trade statistics. International comparisons draw on the World Bank's World Development Indicators (medium- and high-technology manufacturing value added; research and development expenditure), the UNESCO Institute for Statistics, the World

Intellectual Property Organization (WIPO), the OECD Main Science and Technology Indicators, and the MSME Finance Gap database of the International Finance Corporation. The analysis mainly covers the period 2015-2025, which allows developments before and after the launch of the 2017 reforms to be compared.

Manufacturing industries are grouped into high-, medium-high-, medium-low-, and low-technology categories in line with the technology-intensity classification used by the OECD and UNIDO (Galindo-Rueda and Verger, 2016; UNIDO, 2024). Uzbekistan's performance is benchmarked against regional and Asian comparator economies — Kazakhstan, Georgia, Indonesia, the Philippines, and Vietnam — while South Korea is treated as a historical reference case of successful industrial upgrading rather than as a direct statistical comparator. The methods applied include structural (share) analysis, trend analysis of time series, comparative benchmarking, graphical analysis, and a qualitative synthesis of policy documents and reports of international organizations.

The study has several limitations. Data on enterprise numbers, value added, and finance come from different sources and are not always fully comparable. The sectoral distribution of active enterprises is used as a proxy for the structure of the SME sector, and patent applications serve only as a partial indicator of innovation activity. The results should therefore be interpreted as evidence of broad structural tendencies rather than as precise estimates.

4. ANALYSIS AND RESULTS

4.1. Industrial Composition and Enterprise Dynamics

According to the Statistics Agency under the President of the Republic of Uzbekistan (2025b), there were approximately 56.8 thousand operating industrial enterprises in the country as of March 1, 2025, a substantial decline from the peak of 92.0 thousand recorded in 2022. At the same time, the number of newly created industrial enterprises recorded as of March 1 fell steadily, from 3,600 in 2021 to 1,500 in 2025 (Figure 1). A similar contraction has been observed across the enterprise sector as a whole, where the number of active enterprises declined by about one-quarter between early 2023 and early 2025 (Statistics Agency under the President of the Republic of Uzbekistan, 2025a). Although these figures may partly reflect changes in business registration, the steady decline in new entry points to a slowdown in industrial firm creation.

Manufacturing activity is concentrated in food processing and construction-related industries, particularly cement, glass, ceramics, and other building materials. This pattern reflects rapid urbanization and the expansion of housing construction and infrastructure investment, which have sustained strong domestic demand for these products. As a result, output in construction-related industries recorded robust growth through September 2025 (Statistics Agency under the President of the Republic of Uzbekistan, 2025b). As Table 1 shows, food products, other non-metallic mineral products, wearing apparel, fabricated metal products, and furniture together account for about 60% of all industrial enterprises.

Figure 1: Number of operating and newly created industrial enterprises in Uzbekistan, 2021-2025 (as of March 1, thousand units)[1]

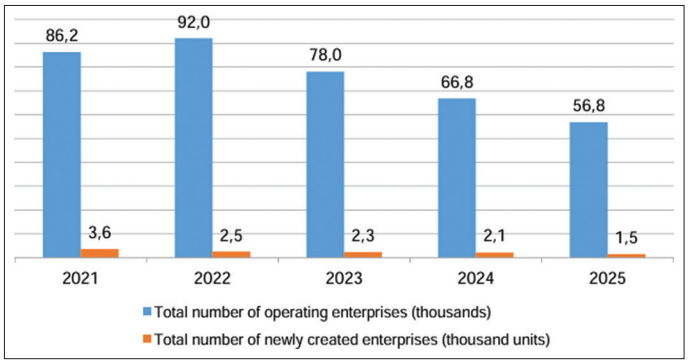


Table 1: Structure of industrial enterprises in Uzbekistan by main manufacturing sub-sector (as of March 1, 2025)[2]

Sector	Number of enterprises (thousand)	Share in total (%)
Food products	11.6	20.5
Other non-metallic mineral products	8.0	14.1
Wearing apparel	5.7	10.1
Fabricated metal products (except machinery and equipment)	4.6	8.0
Furniture	3.9	6.9
Five sub-sectors combined	33.8	59.6

Small and medium-sized enterprises account for the majority of industrial firms by number, whereas large enterprises continue to dominate strategically important industries such as metallurgy, energy, petroleum refining, and automobile manufacturing. Food processing, textiles, and non-metallic mineral products have expanded steadily, supported by rising domestic demand and the availability of agricultural and mineral raw materials. Machinery and chemical production has also increased gradually, indicating some progress in import substitution, although these industries still account for a relatively limited share of manufacturing activity.

Despite these developments, Uzbekistan's manufacturing sector remains concentrated in light industry and resource-processing activities, while high-technology manufacturing and capital-goods production play only a limited role. Much of the country's industrial expansion has therefore been driven by labor-intensive production, domestic demand, and the primary processing of natural resources rather than by technological upgrading. While manufacturing has become more diversified than in the past, the transition toward knowledge-intensive and higher-value-added production has proceeded only gradually.

Industrial production is also characterized by a relatively narrow base of large-scale heavy industries with weak linkages to the rest of the manufacturing sector. Food processing and textiles remain closely connected to agriculture through their reliance

1 Source: Statistics Agency under the President of the Republic of Uzbekistan (stat.uz).

2 Source: Statistics Agency under the President of the Republic of Uzbekistan, as of March 1, 2025.

on domestically produced cotton, grain, livestock, and other raw materials. Likewise, the expansion of cement, glass, ceramics, and fabricated metal products has been closely tied to sustained investment in housing and infrastructure. These sectoral linkages illustrate how manufacturing development continues to depend heavily on domestic resource endowments and construction demand rather than on complex industrial supply chains.

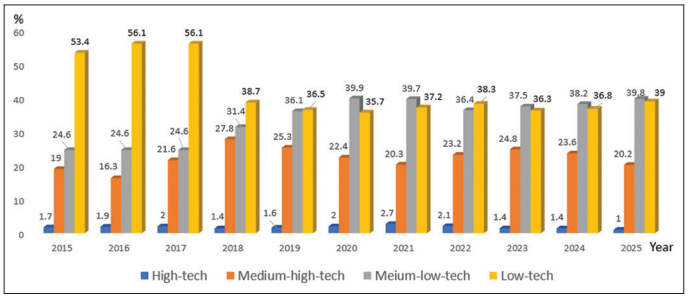
The energy-mining-metallurgy complex remains the backbone of Uzbekistan's industrial economy. It continues to generate a large share of export earnings, fiscal revenues, and investment, and it has driven much of the country's infrastructure development. Gold is particularly important as a source of foreign exchange, although its contribution varies from year to year depending on production volumes and international market conditions. The energy sector also provides essential inputs for electricity generation, fertilizers, chemicals, metallurgy, and many downstream manufacturing industries. This resource-based industrial structure has supported economic growth and macroeconomic stability, but it has generated relatively limited technological spillovers and has slowed the diversification of manufacturing and exports into more sophisticated activities.

4.2. Technological Structure of Manufacturing

Manufacturing is a key driver of structural transformation because it offers opportunities for productivity growth, export diversification, and technological learning. In today's global economy, where production is increasingly organized through fragmented and technology-intensive value chains, sustained income convergence depends not simply on industrialization itself but on the ability to move toward medium- and high-technology manufacturing. Economies that remain concentrated in low-technology production often achieve growth without corresponding structural upgrading, whereas those that expand into more sophisticated manufacturing activities generally experience faster productivity growth, stronger international competitiveness, and higher income levels (Rodrik, 2013; Szirmai, 2012).

Uzbekistan's manufacturing sector experienced noticeable changes in its technological composition between 2015 and 2025 (Figure 2). However, these changes did not follow the pattern typically associated with sustained industrial upgrading. The main shift took place at the lower end of the technology spectrum: the share of low-technology industries fell from 53.4% in 2015 to 39.0% in 2025, while that of medium-low-technology industries rose from 24.6% to 39.8%. High-technology manufacturing never exceeded 2.7% of the total and declined to 1.0% in 2025. The combined share of high- and medium-high-technology industries peaked at about 29% in 2018 and then fell back to about 21% in 2025. Consequently, low- and medium-low-technology industries accounted for between about 70 and 80% of manufacturing in every year of the period.

Figure 2: Technological structure of the manufacturing industry in Uzbekistan, 2015-2025 (percent)[3]



The persistence of this pattern indicates that manufacturing remains concentrated in relatively simple production activities rather than in technologically advanced industries. Although manufacturing output has expanded, much of this growth has occurred in sectors that generate relatively limited technological spillovers and value added.

Several structural factors help explain this outcome. Innovation diffuses slowly across the industrial sector, research and development are only weakly commercialized, and domestic engineering and machinery industries remain underdeveloped. Together, these constraints have limited technological upgrading and slowed the transition toward more knowledge-intensive manufacturing.

Enterprise-level data point in the same direction. A large share of manufacturing firms continues to operate in low-technology industries such as food processing, construction materials, textiles, and the production of simple consumer goods (Table 1). By contrast, relatively few firms have entered more technology-intensive activities, including precision machinery, electronics, advanced chemicals, and industrial equipment. Much of the manufacturing sector also still depends on the country's abundant energy and mineral resources: production is concentrated in relatively short value chains, technological capabilities remain limited, and manufactured exports have yet to establish a strong competitive position in international markets. As a result, manufacturing development remains closely tied to the energy-mining-metallurgy complex.

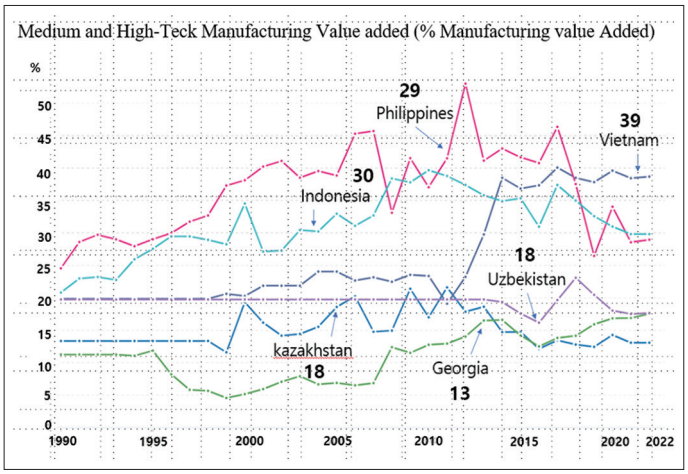
4.3. International Comparison of Technological Upgrading

A comparison of medium- and high-technology (MHT) manufacturing value added confirms that Uzbekistan continues to lag behind many emerging industrial economies (Figure 3). Between 2015 and 2022, the MHT share of manufacturing value added in Uzbekistan fluctuated considerably: After falling to about 17% in 2016, it rose to a peak of about 23% in 2018 before declining to about 18% in 2021-2022. These internationally harmonized estimates differ somewhat from the national data presented in Figure 2 because of differences in sources and methodology, but both point to the same conclusion: technologically advanced industries account for only a modest share of Uzbekistan's manufacturing.

By comparison, Vietnam and the Philippines have achieved substantially higher levels of technological sophistication. The Philippines reached a peak of about 53% in 2012, although its share

3 Source: World Bank, medium- and high-tech manufacturing value added data.

Figure 3: Medium- and high-technology manufacturing value added in Uzbekistan and selected economies, 1990-2022 (percent of manufacturing value added)[4]



subsequently declined to about 29% in 2022. Vietnam experienced a period of rapid growth between 2011 and 2014, when its MHT share roughly doubled, after which the share remained relatively stable at around 38-40%, reaching about 39% in 2022. Indonesia reached a peak of about 40% in 2010 and then followed a gradual downward trend to about 30% in 2022.

Among regional peers, Kazakhstan and Georgia recorded shares of about 18% and 13%, respectively, in 2022, showing only limited progress over time. Uzbekistan's performance is therefore broadly similar to that of Kazakhstan and above that of Georgia, but significantly below that of the leading industrializing economies of East and Southeast Asia — and far below South Korea, where medium- and high-technology industries account for close to two-thirds of manufacturing value added (World Bank, n.d.).

These comparisons suggest that Uzbekistan has made only modest progress in technological upgrading and remains some distance from the industrial sophistication observed in more successful manufacturing exporters. The relatively low share of medium- and high-technology manufacturing value added reflects persistent structural weaknesses in innovation capacity, technological capabilities, and participation in the higher value-added segments of global manufacturing.

4.4. Ownership Structure and the Role of State-owned Enterprises

Manufacturing in Uzbekistan is still concentrated in a relatively narrow range of traditional industries, including textiles, apparel, food processing, chemicals, fertilizers, metallurgy, vehicle assembly, machinery, and construction materials. Much of the recent expansion has taken place in processing and assembly activities rather than in technology-intensive manufacturing. Production therefore remains focused on the lower stages of the value chain, and many firms rely on imported machinery, industrial equipment, and intermediate inputs despite the country's considerable resource endowment.

The ownership structure of manufacturing also differs across industries. Capital-intensive strategic sectors such as chemicals, metallurgy, and automobile manufacturing are largely controlled by state-owned enterprises (SOEs) or by firms with substantial government ownership, whereas private businesses are found mainly in labor-intensive activities, including textiles, garments, food processing, and other consumer goods industries (European Bank for Reconstruction and Development, n.d.; World Bank, 2025c). This pattern reflects the unequal distribution of financial and institutional resources within the industrial sector. State-affiliated enterprises generally benefit from better access to credit, public investment, and administrative support, while privately owned manufacturers often face greater difficulty in financing expansion, acquiring modern production technologies, and entering export markets. Consequently, private firms have played only a limited role in the development of higher value-added manufacturing, and industrial diversification has progressed more slowly than policymakers had anticipated.

Uzbekistan's industrial structure also reflects its historical legacy as part of the former Soviet Union. Following independence, SOEs remained the dominant actors in many industries, preserving many features of the centrally planned economic system (Pomfret, 2019). This development path differs markedly from South Korea's experience: while large private business groups became the main engines of industrialization in Korea (Amsden, 1989), Uzbekistan has continued to rely heavily on SOEs in many strategic industries.

In Uzbekistan, SOEs continue to hold monopolistic or near-monopolistic positions in many strategic sectors and have preserved their dominant market status through substantial financial, administrative, and policy support from the government. Since the launch of market-oriented reforms in 2017, the government has placed the privatization of SOEs high on its reform agenda. Although a number of SOEs have been earmarked for privatization, the process is likely to be gradual and to require a considerable period to complete (IMF, 2024).

Even as privatization progresses, many SOEs still receive favorable financing from state-owned banks, and access to credit therefore remains much easier for these firms than for most privately owned businesses. By contrast, many small and medium-sized private enterprises face persistent constraints in accessing external finance, creating an uneven competitive environment between the state-owned and private sectors.

4.5. Small and Medium-sized Enterprises and Access to Finance

SMEs have become an increasingly important component of Uzbekistan's economy. Small businesses and private entrepreneurship generate slightly more than half of GDP (51.5% in January-September 2025) and account for nearly 75% of total employment (Statistics Agency under the President of the Republic of Uzbekistan, 2026b). As part of its market-oriented

4 Source: World Bank, World Development Indicators (indicator NV.MNF.TECH.ZS.UN).

reform agenda, the government has sought to reduce the dominant role of SOEs and to promote a more private-sector-led model of economic growth.

Despite these developments, access to finance remains one of the principal obstacles to SME expansion. Although lending to the private sector has increased in recent years, many firms continue to face difficulties in obtaining external finance. Fewer than 30% of SMEs have access to formal credit, and only about 10% of small enterprises and 16% of medium-sized enterprises receive bank loans. The financing demand of micro, small, and medium-sized enterprises is estimated at approximately US$13 billion, leaving a financing gap of nearly US$6 billion; existing financial resources thus satisfy only about half of the sector's estimated financing needs (International Finance Corporation and SME Finance Forum, 2025).

Given that small enterprises and microfirms account for approximately 85% of all active enterprises in Uzbekistan (Statistics Agency under the President of the Republic of Uzbekistan, 2026b), the sectoral distribution of active enterprises (Table 2) provides a reasonable, though imperfect, proxy for the sectoral composition of the SME sector. Trade alone accounts for almost one-third of active enterprises (32.6%), compared with 12.7% for industry and only 2.4% for information and communication. The data thus suggest that SMEs are concentrated primarily in wholesale and retail trade and other locally oriented service activities, while comparatively few operate in manufacturing, particularly in medium- and high-technology production. A substantial proportion of SMEs therefore remain engaged in relatively low-technology activities with limited scope for technological upgrading and productivity gains.

This sectoral structure has important implications for Uzbekistan's broader industrial development. Although SMEs account for nearly 85% of active enterprises, their contribution to value added, exports, and innovation remains relatively modest. Limited participation in technology-intensive manufacturing, research and development, and regional or global value chains constrains their ability to generate productivity growth and support industrial upgrading. These challenges are further reinforced by persistent constraints in access to finance, technology, and managerial capabilities.

Table 2: Sectoral distribution of active enterprises in Uzbekistan (percent)[5]

Sector	Share of active enterprises (%)
Trade	32.6
Industry	12.7
Agriculture, forestry and fishing	7.4
Construction	6.3
Accommodation and food services	6.3
Transportation and storage	3.6
Health and social services	2.8
Information and communication	2.4
Other sectors	25.9
Total	100.0

5 Source: Statistics Agency under the President of the Republic of Uzbekistan.

4.6. Export Specialization

Uzbekistan's exports remain dominated by natural resource-based products. In 2025, total exports reached about US$33.8 billion, of which gold accounted for a record US$9.9 billion, or roughly 29% (Statistics Agency under the President of the Republic of Uzbekistan, 2026a). The share of gold also varies considerably within and between years: in the first quarter of 2025, it reached about 44% of total exports. Copper and other non-ferrous metals, textile products, food products, chemicals, and petroleum products are other important export items, although their individual shares are considerably smaller, while natural gas — once a major source of foreign exchange — now accounts for less than 2% of exports. International trade data likewise show that the export basket remains concentrated in a small number of resource-based products (UNCTAD, n.d.-b; World Trade Organization, n.d.).

This heavy reliance on a limited number of primary commodities leaves the economy highly exposed to fluctuations in international commodity markets. A decline in the price of gold or other major export commodities can quickly reduce foreign-exchange earnings, weaken fiscal revenues, and slow economic growth. These vulnerabilities underscore the importance of broadening the export base through greater diversification and the expansion of higher value-added manufacturing. Over the longer term, deeper domestic processing of natural resources and the development of more capital- and technology-intensive industries could strengthen export resilience and reduce dependence on commodity-based growth (Hausmann et al., 2007). Achieving this objective will require not only expanding manufacturing capacity but also improving technological capabilities, strengthening inter-firm linkages, and increasing the participation of domestic enterprises in regional and global value chains.

4.7. Industrial Linkages, Clusters, and Value Chains

Although Uzbekistan has established numerous industrial and special economic zones, these initiatives have not yet generated the dense supplier networks and institutional linkages that characterize successful industrial clusters (World Bank, 2025b). Physical proximity alone has proven insufficient to strengthen supplier relationships, facilitate knowledge spillovers, or promote sustained technological collaboration. An important constraint is the limited development of domestic supply chains: Many large manufacturers continue to depend on imported intermediate inputs, while domestic SMEs often find it difficult to meet the quality, scale, and certification requirements of larger firms. Collaboration among enterprises, universities, and public research institutions also remains limited, restricting technology transfer and joint innovation. Recent policy reviews have also called for a more systematic assessment of the costs and benefits of the tax incentives offered to investors (OECD, 2025b; UNCTAD, n.d.-a).

As a result, manufacturing activity remains relatively fragmented, and integration into regional and global value chains is still limited. Productivity gains achieved by individual firms have generated only modest spillover effects, slowing the diffusion of new technologies across industries and constraining broader industrial upgrading.

4.8. Research, Development, and Innovation

In 2023, Uzbekistan's gross domestic expenditure on research and development (GERD) amounted to approximately 0.13% of GDP, down from 0.16% in 2022 (World Bank, 2025a). Although annual expenditure has fluctuated modestly, GERD has remained below 0.2% of GDP for most of the past two decades. After reaching approximately 0.36% in 2000, the ratio declined gradually to around 0.11% in 2019 before recovering only marginally in subsequent years.

The persistently low level of investment suggests that research and innovation have yet to become central drivers of Uzbekistan's industrial transformation. By comparison, many middle-income economies invest around 1% of GDP in research and development, expenditure in advanced economies often exceeds 2% (UNESCO Institute for Statistics, 2025), and South Korea spends close to 5% — one of the highest ratios in the world (OECD, 2025a). These differences reflect not only greater financial resources but also stronger research institutions, more mature innovation ecosystems, and a greater capacity to generate, absorb, and commercialize new technologies.

A similar pattern is evident in patenting activity. Uzbekistan recorded 752 patent applications in 2023, including 518 applications filed by residents (68.9%) and 234 by non-residents (31.1%) (WIPO, 2025b). The predominance of resident applications indicates that domestic inventors account for most patent filings. Nevertheless, the overall number of applications remains modest by international standards, suggesting that innovation activity is still at a relatively early stage of development. In the Global Innovation Index 2025, Uzbekistan ranked 79th among 139 economies, and its innovation outputs (92nd) lagged behind its innovation inputs (69th) (WIPO, 2025a). Although patent statistics and composite indices cannot fully capture a country's innovative performance, they provide useful proxies for the creation and commercialization of new knowledge. Taken together, the evidence suggests that Uzbekistan continues to face important challenges in strengthening its research base, enhancing technological capabilities, and translating scientific knowledge into commercially viable innovations.

4.9. Financial System and Capital Markets

Uzbekistan's financial system continues to depend heavily on banks as the principal source of external finance. Since 2017, the government has introduced a number of reforms aimed at developing capital markets and broadening the range of financial instruments available to investors. Nevertheless, the securities market remains relatively small, trading volumes are modest, and the investor base is narrow (IMF, 2024). Consequently, financial markets have yet to play a significant role in mobilizing domestic savings and channeling them into productive investment.

The consequences of this financial structure are particularly evident in the private sector. Many SMEs continue to rely primarily on internally generated funds because access to external finance remains limited. A substantial share of formal credit is still absorbed by SOEs, especially in infrastructure and energy-related activities, reflecting the continued importance of the state in resource allocation (World Bank, 2025c). As a result, private firms frequently encounter financing constraints that restrict investment, expansion, and technological upgrading.

The limited development of equity financing constitutes an additional structural weakness. The domestic stock market is dominated by a relatively small number of large state-owned companies, while participation by institutional and retail investors remains limited. Low liquidity and the absence of a broad investor base have reduced the capacity of capital markets to provide long-term funding for private enterprises.

These features suggest that financial deepening remains an important but incomplete aspect of Uzbekistan's economic transition. Further progress in capital market development, together with the expansion of non-bank sources of finance, would improve the allocation of financial resources and broaden access to funding for private businesses. Over time, a more diversified financial system could strengthen private-sector development, promote industrial upgrading, and support the country's long-term structural transformation.

4.10. Lessons from South Korea's Industrial Transformation

South Korea's development path was shaped to a large extent by its lack of exportable natural resources. Because the country could not rely on resource exports to earn foreign exchange, the government adopted an export-oriented development strategy in the early 1960s and, beginning in 1962, implemented a series of 5-Year Economic Development Plans to guide industrialization (Amsden, 1989).

Industrial development proceeded in stages. The economy initially depended on labor-intensive industries such as textiles, apparel, and footwear, but from the 1970s — particularly after the launch of the Heavy and Chemical Industry Drive in 1973 — it expanded into steel, shipbuilding, automobiles, petrochemicals, and machinery. In subsequent decades, South Korea moved successfully into high-technology industries, notably semiconductors, displays, and rechargeable batteries. Through this process of continuous industrial upgrading, the country transformed itself from an aid-dependent low-income economy into one of the world's leading industrial nations, with per capita gross national income exceeding US$30,000 for the 1st time in 2018 (Bank of Korea, 2019).

Several features of the Korean model are particularly relevant for Uzbekistan. First, government support for industry — including preferential credit from state-controlled banks — was conditioned on performance, above all on export targets, which exposed supported firms to international competition and disciplined the use of public resources (Amsden, 1989). Second, industrial policy was closely coordinated with investment in education, engineering skills, and technological learning, enabling Korean firms to move from imitation to innovation (Kim, 1997). Third, upgrading proceeded step by step, from labor-intensive industries to heavy and chemical industries and later to technology-intensive sectors, rather than through an attempt to leap directly to the technological frontier (Lee, 2013). Finally, the main agents of industrialization were privately owned firms operating under strong competitive

pressure in export markets, whereas in Uzbekistan SOEs still dominate many strategic sectors.

Although the Asian Financial Crisis of 1997-1998 and the Global Financial Crisis of 2008 caused severe economic disruptions, these crises — the first in particular — also accelerated corporate restructuring, financial-sector reform, and institutional change. These adjustments ultimately enhanced economic efficiency and reinforced the foundations for sustained long-term growth.

5. CONCLUSION AND RECOMMENDATIONS

This study has shown that Uzbekistan's industrial expansion since 2017 has not yet been accompanied by a corresponding transformation of its industrial structure. Industrial growth continues to rest on the energy-mining-metallurgy complex and on resource- and construction-related manufacturing. Low- and medium-low-technology industries still account for roughly three-quarters of manufacturing, the share of medium- and high-technology industries in manufacturing value added remains around 18%, and gold alone generates close to 30% of export earnings. These outcomes are rooted in mutually reinforcing structural constraints: the dominance of SOEs in strategic sectors, a private sector composed mainly of small firms in trade and services, weak domestic supply chains, very low investment in research and development, and a bank-dominated financial system that channels a large share of credit to the state sector.

At the same time, Uzbekistan possesses a number of structural strengths that provide a solid basis for future industrial development. The country is endowed with abundant natural resources, a relatively young and growing labor force (International Labour Organization, n.d.), and a domestic market of more than 38 million people. Its location at the heart of Central Asia also creates opportunities to expand regional trade and transport links. In addition, recent improvements in infrastructure and the business environment have made Uzbekistan increasingly attractive to domestic and foreign investors. These favorable conditions, however, do not by themselves guarantee successful industrial transformation; their long-term contribution will depend largely on the government's ability to sustain institutional reforms and create a more competitive business environment.

Recent economic performance has also strengthened the country's development prospects. GDP grew by 6.5% in 2024 and by 7.7% in 2025 (Statistics Agency under the President of the Republic of Uzbekistan, 2026c), providing a stable foundation for more ambitious industrial policies. The government's long-term objective, set out in the Uzbekistan-2030 Strategy, is not only to expand industrial output but also to diversify production, increase productivity, and join the group of upper-middle-income countries by 2030 (President of the Republic of Uzbekistan, 2023). Reaching this objective will require a gradual shift away from resource- and labor-intensive activities toward industries capable of generating greater value added through technological upgrading, innovation, and the expansion of knowledge-intensive manufacturing.

Although South Korea's industrialization took place under very different historical, institutional, and economic circumstances, several aspects of its experience remain relevant. Perhaps the most important lesson is that sustained industrial upgrading depends on consistent investment in technology, human capital, and innovation, combined with exposure to international competition. South Korea's experience should therefore be regarded not as a blueprint for replication but as a source of strategic lessons that can be adapted to Uzbekistan's own development priorities and institutional setting.

From this perspective, future industrial policy should place greater emphasis on strengthening the competitiveness of the private sector while continuing the transition toward a more market-oriented economy. Based on the findings of this study, the following priorities are recommended:

1. Reforming state-owned enterprises and ensuring competitive neutrality: The privatization and corporatization of SOEs in competitive, non-strategic sectors should continue, the ownership and regulatory functions of the state should be clearly separated, and private firms should be given equal access to credit, public procurement, land, energy, and other inputs.
2. Making industrial support conditional on performance: Following the Korean principle of reciprocity, tax incentives, preferential loans, and special economic zone privileges should be linked to measurable results — exports, local supplier development, productivity gains, and technology adoption — and should be evaluated regularly, with ineffective incentives phased out.
3. Expanding long-term finance for private manufacturers: Credit guarantee schemes, development finance, leasing, and factoring should be scaled up, while capital markets should be deepened through corporate bond issuance, public offerings of minority stakes in large SOEs, and the development of institutional investors such as pension funds and insurance companies.
4. Strengthening the national innovation system: Public and private R&D spending should be raised gradually toward the levels observed in comparable middle-income economies, and cooperation between universities, research institutes, and industry should be encouraged through matching grants, technology transfer offices, and technology extension services for SMEs, together with stronger engineering and technical education.
5. Developing domestic supply chains and value chain integration: Supplier development programs should help SMEs meet the quality, scale, and certification requirements of large manufacturers and foreign investors; quality infrastructure (standards, testing, and certification) should be modernized; and export-oriented foreign direct investment should be attracted into medium- and high-technology industries such as electrical equipment, machinery, automotive components, and chemicals.

Progress in these areas would not only raise productivity and improve economic resilience but also support the emergence of a more diversified, technologically sophisticated, and internationally competitive industrial sector. Future research could extend this analysis by using enterprise-level data to examine productivity differences between state-owned and private firms and to assess the effectiveness of special economic zones and other industrial support instruments.

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