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Research paper

Regional Industrial Development and Growth Pole Formation: Key Factors for Sustainable Economic Expansion

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Abstract

The study aimed to identify key factors and mechanisms that contribute to the successful development of regional industry and the formation of economic growth centres. The study uses analysis of official statistics, review of economic and geographical theories, spatial analysis of production concentration, systematization of regulatory and legal documents, as well as assessment of the dynamics of the industrial structure of the regions. The main theoretical models, including Perroux's growth pole theory, Porter's regional clusters, and Vernon's product life cycle models, which explain the mechanisms of industrial production concentration in certain regions, were analysed in the study. Based on the data for Uzbekistan, a detailed analysis of the factors influencing the development of industry in the regions of the country, such as infrastructure, innovation, and economic diversification, was conducted. The study examined changes in the structure of industrial production, territorial differentiation, and its relationship to industrialisation policies, including modernisation and technological upgrading. The study determined that most of the industrial production in Uzbekistan is concentrated in three economic regions – Tashkent, Zarafshan, and Fergana. The study also analysed the consequences of concentrating industrial capacities around the growth poles, which contribute to economic integration and development of adjacent territories. The analysis demonstrated that measures to develop small businesses and create technopolises and industrial clusters are substantial in stimulating employment and improving living standards. The study also described the results of the industrial diversification policy, such as the decline in the share of light industry and the growth of heavy engineering, chemical, and gas industries. Based on the analysis, the study concluded that a comprehensive approach to regional development planning is needed, including consideration of natural and economic conditions, creation of modern infrastructure, and implementation of innovative projects.

Keywords: *Gross Domestic Product; Industrial Zones; Investments; Diversification; Investment*

1. Introduction

Regional industrial development and the formation of growth poles are crucial aspects of economic policy, as they directly affect sustainable economic expansion and the improvement of local living standards. In the context of globalisation and active integration of global markets, many economies are facing the need to ensure the balanced development of their territories, which requires a careful approach to regional strategy. Industrial clustering and the creation of economic growth centres, which can become drivers for the entire economy of Uzbekistan, are of particular importance in these processes.

The research relevance is determined by the current challenges faced by regions in the post-industrial economy, including the need to adapt industrial structures to new conditions, intensify interregional competition, and search for sustainable development models. In these conditions, a strategic approach to industrial development, including the use of the concept of growth poles, becomes substantial for ensuring the competitiveness of the region and the country. Growth poles, as economic and production centres, contribute to economic diversification, job creation, and infrastructure improvement, which in turn contribute to the growth of living standards and improvement of the social situation in the region (Hlushko 2024).

The challenge is determined by the complex coordination of economic and industrial development processes, the need to create conditions for the active involvement of the private and public sectors in the development of industrial clusters, and the need to overcome regional imbalances. An important aspect is the integration of the latest technologies and innovations into industrial production, which requires flexibility and readiness for change on the part of both the government and business.

The concept of growth poles is based on the idea of concentrating resources to boost productivity and innovation in certain areas. By developing around key industries or large enterprises, regions can create favourable conditions for attracting additional investment and talent (Malyarets et al. 2019; Ismayilov et al. 2024). However, the successful implementation of this model requires carefully considered government and regional policies aimed at supporting innovative and high-tech industries, improving infrastructure and education, and addressing territorial economic disparities.

Studies by various authors in the field of regional development and the formation of growth poles provided important conclusions that were used for further analysis. For instance, McCann & Van Oort (2019) demonstrated that economic growth is centred around large enterprises that create attractive forces for other sectors of the economy, which confirms the central role of industrial centres in regional development. Subsequently, the research by Wang & Meng (2020) explored the understanding of this process, highlighting the importance of clustering and synergies between enterprises to increase productivity. Martins (2023) demonstrated that without integrated infrastructure development, the effect of growth poles can be limited, and regional imbalances can be amplified. In support of this idea, the study by Vlados & Chatzinikolaou (2020) demonstrated that growth poles contribute to accelerated development only if they are integrated into a broader regional context, including transport and logistics links. Proost & Thisse (2019) emphasised the spatial economy, pointing out that the concentration of economic activity depends not only on production factors but also on geographical location. Such conclusions were supported by Stachová et al. (2019), who analysed how the availability of skilled labour and educational centres near industrial clusters contributes to their sustainable development. Asheim (2019) studied the role of innovation and concluded that regions investing in research centres gain a significant advantage in the long term. At the same time, Yan et al. (2024) showed that high-tech industries are often concentrated in regions with a historically developed industrial base, which requires an integrated approach to involve less developed territories. Sgroi (2021) introduced a social aspect to the discussion, demonstrating that the success of regional development is closely related to the involvement of the local population and levels of social cohesion. In turn, Charbit (2020) highlighted decentralisation policies, noting that devolution of powers to the regional level allows for better adaptation of strategies to local conditions. Ahmed et al. (2020) emphasised the importance of sustainable use of natural resources in the context of regional growth, linking industrial development with environmental responsibility.

These studies emphasise the multidimensional nature of the topic and the need for an interdisciplinary approach to analysing the formation of growth poles. Despite the considerable amount of work on regional industrial development and growth poles, there are still areas requiring deeper research. One such topic is the assessment of the effectiveness of different models of growth poles in the transition to a sustainable economy. The long-term impact of growth poles on social equity also remains an open question. In addition, there are gaps in the analysis of the role of small and medium-sized enterprises in the process of industrialisation.

The study aims to identify the key factors in the formation of growth poles in the context of sustainable economic development in Uzbekistan. The study objectives were to analyse regional differences in the development of industrial potential and identify problem areas requiring additional attention; assess the role of small and medium-sized enterprises in the industrialisation process and their contribution to the development of the country's regions; and develop recommendations for applying the concept of growth poles to reduce regional disparities in economic development.

2. Materials and methods

To study the regional industrial development in the Republic of Uzbekistan, a comprehensive approach was used, including methods of analysing statistical data, studying theoretical models of economic growth, and systematising information on the specifics of the industrial potential of different regions of the country. The main sources of information were the official data of the Statistical Agency under the President of the Republic of Uzbekistan (2025), regulatory and legal acts, and policy documents on industrialisation and regional development (Decree of the President of the Republic of Uzbekistan No. DP-158…, 2023; United Nations Economic Commission for Europe, 2022). Legal acts, such as the Resolution of the President of the Republic of Uzbekistan No. PP-1442 "On Priority Areas of Industrial Development of the Republic of Uzbekistan for 2011-2015" (2010); Resolution of the President of the Republic of Uzbekistan No. PP-1856 "On the Program for the Development of the Industrial Potential of the Khorezm Region for 2013-2015" (2012); Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 233 "On the Program for Further Development of Industrial Potential, Creation of Modern Service and Eco-Tourism Facilities in the Syr Darya Region for 2015-2017" (2015); Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 617 "On Measures to Accelerate the Implementation of Investment Projects and Industrial Development in the Fergana Region" (2019); Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. PF-4707 "On the Program for the Development of Industrial Potential of the Surkhandarya Region for 2015-2017" (2015) was studied. These documents were used to assess the strategic directions of the state policy in the field of industrialisation. The study also analysed economic modernisation programmes aimed at structural transformation and diversification of the regional economy, which helped to identify the main mechanisms for stimulating industrial growth.

The first stage of the study included a review of economic and geographical theories explaining the concentration of industry in certain regions, such as François Perroux's pole growth theory, Vernon's product life cycle model, and Michael Porter's concept of regional clusters. These theoretical models were used to substantiate the patterns that determine the location of production facilities and the formation of regional centres of economic activity in Uzbekistan.

The second stage involved a detailed analysis of the regional structure of the country's industry using statistical data. Gross domestic product (GDP), industrial production, the structure of value-added, and the distribution of small and large businesses by region were addressed. Dynamics of changes in the share of key industries, including machine building, metallurgy, chemicals, and textiles, as well as the impact of large industrial projects on economic activity in the regions, were emphasised.

To assess the impact of industry on regional development, the study examined such aspects as job creation, infrastructure improvement, and investment attraction. A comparative analysis of the share of industry in GDP by region was used to identify growth patterns in economically active regions (Tashkent and Navoi Province) and peripheral areas.

The methodological basis of the study included a spatial analysis of economic activity and an assessment of production concentration. This approach examined the factors that determine the industrial potential of the regions, including the availability of natural resources, infrastructure accessibility, labour force qualifications, and investment attractiveness. Examples of industrial clusters, such as automotive plants in the Andijan region and technology parks in the Tashkent region, were considered.

While the study relies on official statistical data provided by the Statistical Agency under the President of the Republic of Uzbekistan, the exclusive use of such sources entails certain methodological limitations. In post-Soviet contexts, national statistical systems often face structural and institutional challenges that may affect data validity. These include issues of data harmonisation, outdated methodologies,

selective reporting, and limited transparency in data collection practices (Libman and Obydenkova 2013; Guliyev 2015). In some cases, political incentives can result in over-reporting economic performance or under-reporting regional disparities to align with state development narratives. The legacy of centralised planning continues to shape data-gathering frameworks, potentially introducing systemic bias, especially in regional industrial statistics. Moreover, informal economic activities—which remain significant in several regions of Uzbekistan are often excluded from formal statistical registers, thereby limiting the completeness of the analysis. To enhance the reliability of future research, triangulation with independent surveys, international datasets, or satellite-derived indicators is recommended to cross-validate trends and assess discrepancies in official reporting.

3. Results

3.1 Theoretical foundations of regional industrial growth

Regional industrial development is an important aspect of economic policy, and various theories and models seek to explain and justify how and why industrial sectors develop regions. One of the first and best-known theories is the classical centre-periphery model, proposed in the mid XX century. This model states that economic development is always concentrated in large cities or regions, which become centres of attraction for economic and social processes, while more remote areas remain peripheral and less developed (Faggian et al. 2019; Koldovskyi 2024).

Regional growth models, such as the Vernon model (product life cycle stage), also emphasise the importance of innovation and technological progress in driving industrialisation. Products go through several stages, from initial innovation to mass production, which leads to an increase in the concentration of industrial capacity in certain regions (Rasiah & Yap, 2019). In turn, theories based on the idea of "regional clusters" (e.g., Porter's model) argue that the concentration of industries and specialists in certain geographical areas allows regions to effectively share knowledge, create supply networks, and accelerate innovation processes (Bergman & Feser, 2020).

There is also the concept of the industrial pole, proposed by François Perroux, which views certain regions as centres of growth and development that contribute to the improvement of the situation in neighbouring areas through the "leakage effect". This effect in the context of François Perroux's theory of industrial poles refers to the diffusion of economic benefits from a dynamic centre of growth (a "growth pole") to surrounding, less developed regions. Specifically, it describes how resources, innovation, technology, income, employment, and infrastructure improvements generated in the growth pole can gradually "leak" or spread beyond its immediate geographic boundaries, stimulating development in adjacent areas. These centres foster innovation, and the expansion of industry leads to job creation, increased incomes, and improved infrastructure (Caldari 2024; Shahini & Shahini 2024). Furthermore, such growth poles can be developed both through government intervention and private companies, creating a symbiotic relationship between industrial and social development.

Industrialisation is substantial in the economic growth of both countries and regions. The core of industrialisation is the transformation of the raw materials and agricultural sectors of the economy into more efficient and profitable manufacturing industries (Tleubayev et al. 2024; Berisha & Rexhepi 2022). It serves as the basis for job creation, increased production capacity, and infrastructure improvements. Most importantly, industrialisation provides an opportunity to diversify the region's economy, reducing dependence on natural resources or agriculture.

One of the most important factors driving growth is the increase in the added value of products. Converting raw materials into finished products on site (e.g., processing natural resources or creating new technologies) allows regions to reap greater benefits, retain a highly skilled workforce, and increase domestic production. At the same time, industrialisation of the region helps to improve the living standards of the local population by creating sustainable employment, raising incomes, and stimulating consumption (Inkeles 2022).

A key aspect of industrialisation is the creation of infrastructure that not only facilitates the development of industry but also improves living conditions for the population. Efficient transport systems, energy infrastructure, and communication technologies become an integral part of economic growth, improving the interaction between regions and production centres (Llazo et al. 2024). Regions that have successfully passed the industrialisation stage have highly developed production and economic structures that ensure their significant competitiveness in the international arena (Makhazhanova et al. 2024).

The theory of growth poles, proposed by François Perroux, is a model in which certain regions or cities become centres of economic growth, around which economic and social ties gradually form. These growth poles actively contribute to the development of neighbouring areas, creating positive externalities. The idea is that such regions concentrate resources, innovations, and investments, allowing them to create large production and technological clusters that become centres for the development of other industries (Rauhut & Humer 2020).

Growth poles can be developed not only in large cities or megacities but also in less developed or remote regions if the right conditions are created for the concentration of investment and innovative initiatives. One example of such development is the creation of industrial clusters or innovative technology parks that attract both local and international investment.

The main effect of growth poles is the creation of jobs, improvement of infrastructure, and attraction of skilled labour. This results in economic integration of regions, poverty reduction, and sustainable economic growth (Zheng 2021). Growth poles are essential for the implementation of national economic strategies, as they not only stimulate growth but also promote the development of more remote and underdeveloped areas (Rexha et al. 2024; Podra & Petryshyn 2023).

Thus, the growth pole theory explains how certain regions can influence broader economic processes, increasing the overall rate of development of a country and stimulating structural changes in the economy. These regions are the core around which both economic and social activities are concentrated, creating a multiplier effect for the entire region or country.

3.2 Regional patterns and industrial differentiation in Uzbekistan

Uzbekistan has made some progress in developing and improving the structure of its regional industry, where specialisation remains narrow while regional integration is high. Almost 90% of industrial production is concentrated in three economic regions: Tashkent, Zarafshan, and Fergana (Statistical Agency… 2025).

In the Republic, the priority task is to ensure stable and accelerated growth of the industrial sector, both at the national level and in the regions. To this end, specific initiatives are being implemented, including the adoption of resolutions aimed at economic renewal and the development of industrial enterprises in certain regions: Resolution of the President of the Republic of Uzbekistan No. PP-1442 "On Priority Areas of Industrial Development of the Republic of Uzbekistan for 2011-2015" (2010); Resolution of the President of the Republic of Uzbekistan No. PP-1856 "On the Program for the Development of the Industrial Potential of the Khorezm Region for 2013-2015" (2012); Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 233 "On the Program for Further Development of Industrial

Potential, Creation of Modern Service and Eco-Tourism Facilities in the Syrdarya Region for 2015-2017" (2015); Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 617 "On Measures to Accelerate the Implementation of Investment Projects and Industrial Development in the Fergana Region" (2019); Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. PF-4707 "On the Program for the Development of Industrial Potential of the Surkhandarya Region for 2015-2017" (2015). The strategic plan of development of the Republic of Uzbekistan until 2030 also emphasises the development of a high-tech textile industry, which deep-processes raw materials, meets the internal needs of the population, is based on the natural competitive advantages of the country and is integrated into the system of global distribution of labour (Decree of the President of the Republic of Uzbekistan No. DP-158…, 2023).

Along with the technical and technological equipment of key industries, the country has formed labour-intensive industries focused on the production of consumer goods, including such areas of engineering as the automotive industry, electrical engineering, and household appliances. This will allow the development of these industries, saturation of the domestic market, and organisation of large export supplies, accumulation of national capital, and the creation of technopolises and clusters.

The 48th point of the "Uzbekistan – 2030" strategy, "Ensuring the welfare of the population through sustainable economic growth," envisages the development of "driver" industries and full utilisation of the industrial potential of the regions. It is necessary to increase the value added in industry to 45 billion USD and create 2.5 million high-income jobs. It is also planned to produce import-substituting products by large enterprises, expand cooperation links with regional enterprises, and introduce a system of active incentives for enterprises that have established industrial cooperation. Creation of modern technological industrial zones in each district. It is planned to bring the level of yarn processing in the textile industry to 100% and to establish the production of 400 thousand tonnes of man-made and blended fibre to meet the demand for high-quality fabric (Decree of the President of the Republic of Uzbekistan No. DP-158… 2023).

In the context of the transition to a market economy, regions should define strategic priorities and evidence-based development programmes. For some regions, labour resources could be central to economic growth, while for others, natural resources may be the key to growth. In some regions, development is driven by a favourable economic and geographical location, while in others it is driven by perfectly developed infrastructure. Therefore, regions differ significantly in the pace and direction of industrial development.

Regional peculiarities of the Republic are determined by its different natural and economic potential (Fedorenko 2024). Their development reflects the influence of historical, economic, and social factors that determined unique stages of formation. For instance, until the 1950s, the Lower Amu Darya remained isolated due to the lack of modern transport links, including railways. During World War II, more than 200 heavy industry enterprises were evacuated to Uzbekistan, making the republic the central cotton-producing region in the Soviet Union. At that time, the national economy relied mainly on the light industry, focused on cotton processing and textile production, concentrated in centres such as Tashkent and Fergana. After the war, machine-building plants were reoriented towards civilian production, which contributed to the development of heavy industry, including agricultural machine building, aircraft construction, and ferrous metallurgy. In the 1960s and 1970s, the discovery of large gold and gas deposits in the Kyzylkum and Karshi deserts significantly increased the industrial potential of Bukhara, Navoi, and Kashkadarya provinces. At the same time, the development of coal and copper deposits in the Tashkent region contributed to the further growth of economic activity in this region (Khaydarov et al. 2020; Prokhorova et al. 2025).

Until the middle of the 20th century, the transport isolation of the Lower Amu Darya region hindered the efficient development of natural resources and industrial development. At the same time, the active development of mineral deposits and the launch of energy cycles contributed to the formation of key industries in Navoi, Bukhara, Kashkadarya, and Tashkent provinces. The collapse of the Soviet Union had several negative consequences for the economy, but the creation of large industrial enterprises in such sectors as automotive, gas, chemicals, and oil refining significantly changed the distribution of industrial production across the country's regions (Ismayilov et al. 2021; Aliyev et al. 2023). For instance, the launch of a passenger car manufacturing plant in Asaka, Andijan Province, in 1996, and the development of a network of enterprises for the local production of components almost doubled the region's contribution to the country's total industrial output (Nizaev 1996). Figure 1 shows the national GDP and industrial production.

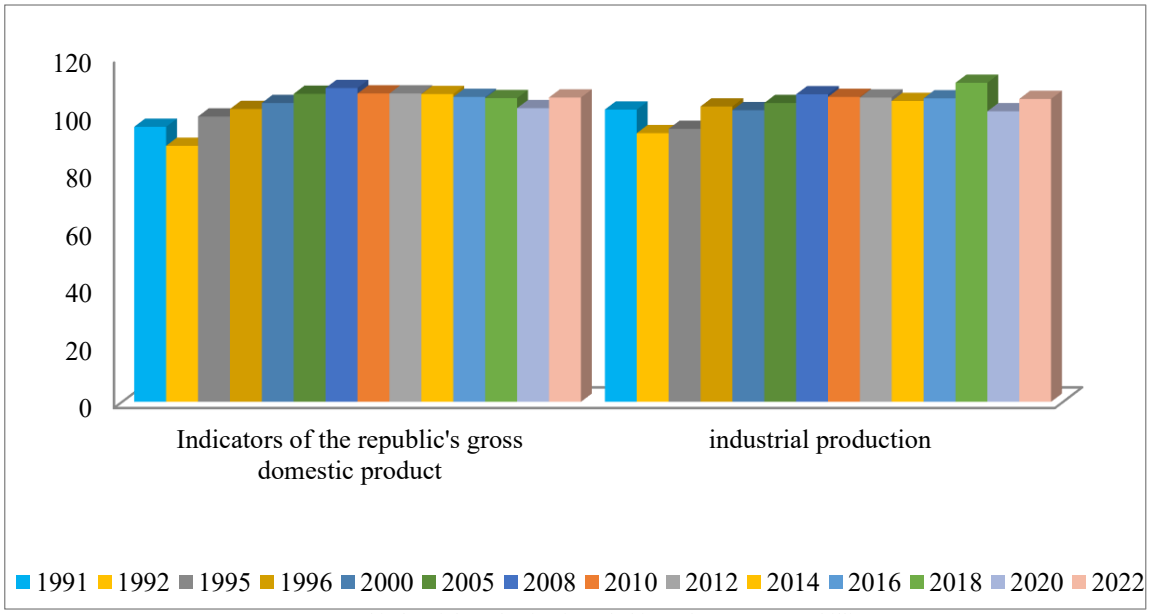

Fig. 1: GDP and industrial production in Uzbekistan for 1991-2022, billion USD

Source: compiled by the authors based on the Statistical Agency under the President of the Republic of Uzbekistan (2025).

All sectors of the national economy are actively modernised, with technically and technologically upgraded production facilities. These measures are already yielding noticeable results. Analyses show that industrial production in the Republic has demonstrated stable and high growth over the years of independence. Except for the early 1990s, the annual rate of increase was 7-8% year-on-year.

In some periods, the growth rates of industrial production exceeded the GDP growth rates. Mechanical engineering, metalworking, chemical, and petrochemical industries developed especially dynamically at that time (Statistical Agency… 2025). In cooperation with international companies, key industrial infrastructure facilities were built and modernised: Bukhara oil refinery (with the participation of Technip, France), Shurtan and Ustyurt gas chemical complexes (ABB, KOGAS), Kandym gas processing plant (Lukoil, Russia). In addition, the Fergana oil refinery underwent a complete reconstruction (Raimondi 2019). Figure 2 demonstrates the structure of Uzbekistan's GDP reflecting these changes.

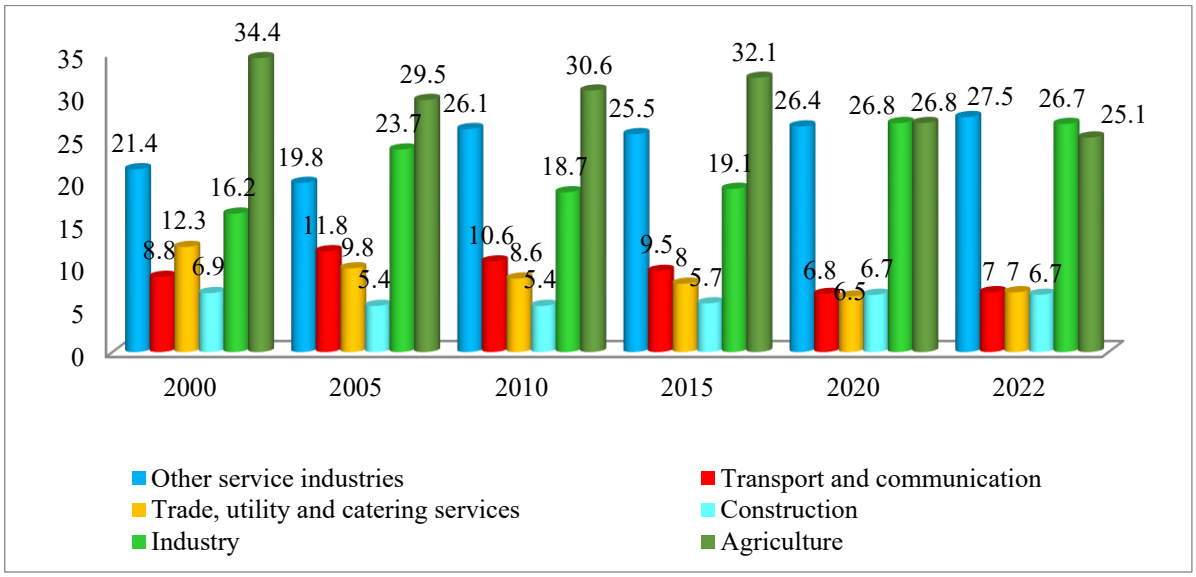

Fig. 2: GDP structure in Uzbekistan in 2000-2022, %

Source: compiled by the authors based on the Statistical Agency under the President of the Republic of Uzbekistan (2025).

The development of the gas and chemicals industry has created opportunities for deeper processing of natural gas and stimulated the creation of new production facilities in related industries. In the chemical industry, important projects were implemented in the period under review: production at the Kungrad soda ash plant began in 2006, the Dekhkanabad potash fertiliser plant was launched in 2010, and the Ustyurt gas chemical complex was commissioned in 2016. These measures have significantly increased the role of industry in the national economy. The share of this sector in the GDP structure increased from 16.2% in 2000 to 26.7% in 2022 (Statistical Agency… 2025). Figure 3 shows the structure of industrial production in the country, reflecting the changes that have taken place.

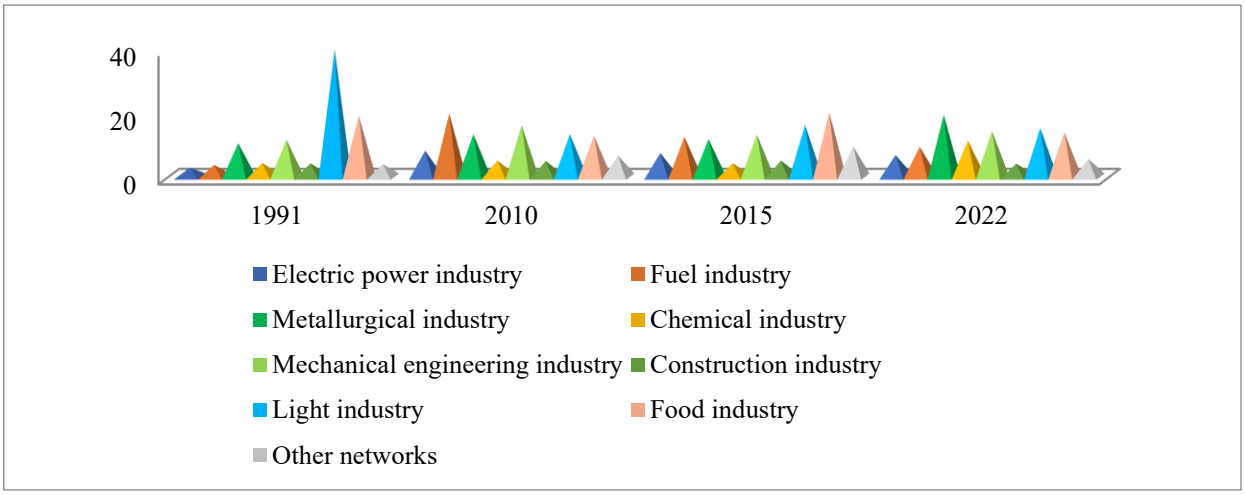

Fig. 3: Structure of industry of the republic for 1991-2022, %

Source: compiled by the authors based on the Statistical Agency under the President of the Republic of Uzbekistan (2025).

The share of metallurgy, one of the key national industries, doubled to 19.4% by 2022. The main capacities of this industry are concentrated in Tashkent and Navoi regions. Significant changes also occurred in the machine-building sector. The share of this industry increased from 11.6% to 14.3% between 1991 and 2022 (Statistical Agency…, 2025).

In 1991, the light industry (39.9%) and the food industry (19.1%) accounted for the bulk of the country's industrial output. Currently, these figures have dropped to 15.3% and 13.9% respectively. The dominance of the light industry in the Soviet era was determined by the one-sided development, with cotton ginning accounting for about 60% of the volume. In recent years, there has been a trend towards an increase in the share of other industries, such as machine building, food processing and non-ferrous metallurgy. This indicates the diversification of the industry and changes in its structure. The detailed structure of industrial production by region is shown in Table 1.

Table 1: Territorial structure of industrial production in Uzbekistan (in % of the total volume)

No.	Name of the regions	Years								
		1991	1995	2000	2005	2010	2020	2021	2022	com-pared to 1991 (+,-)
1.	Tashkent Economic District	30.8	36.3	32.8	28.3	32.2	35.8	38.1	36.7	+5.9
1.1.	Tashkent city	16.3	17.1	16.7	11.6	19.5	17.9	19.8	19.7	+3.4
1.2.	Tashkent region	14.5	19.2	16.1	16.7	12.7	17.9	18.3	17.0	+2.5
2.	Mirzachol economic district	5.1	4.2	4.5	4.6	2.6	3.8	4.1	4.3	-0.8
2.1.	Jizzakh region	2.3	1.3	1.2	1.8	1.3	1.6	1.9	2.1	-0.2
2.2.	Syrdarya region	2.8	2.9	3.3	2.8	1.3	2.2	2.2	2.2	-0.6
3.	Fergana economic district	26.0	26.2	23.7	23.6	23.1	18.8	17.2	18.6	-7.4
3.1.	Andijan region	6.4	5.4	7.7	10.9	12.3	9.9	7.9	9.8	+3.4
3.2.	Namangan region	6.5	4.4	3.9	3.1	2.5	3.0	3.2	3.3	-3.2
3.3.	Fergana region	13.1	16.4	12.1	9.6	8.3	5.9	6.1	5.5	-7.6
4.	Zarafshan economic district	21.6	18.3	24.1	24.3	19.1	27.5	25.7	25.5	+3.9
4.1.	Bukhara region	5.3	4.1	6.4	4.8	4.4	4.8	4.6	4.9	-0.4
4.2.	Navoi region	8.8	8.0	11.8	15.9	9.9	17.7	16.1	15.3	+6.5
4.3.	Samarkand region	7.5	6.2	5.9	3.6	4.8	5.0	5.0	5.3	-2.2
5.	Southern economic district	9.8	7.8	9.6	15.4	12.1	5.4	5.6	5.4	-4.4
5.1.	Surkhandarya region	3.4	2.3	2.4	2.0	1.8	1.4	1.5	1.3	-2.1
5.2.	Kashkadarya region	6.4	5.5	7.2	13.4	10.3	4.0	4.1	4.1	-2.3
6.	Lower Amu Darya Economic District	6.7	6.6	5.3	3.7	2.8	6.4	6.6	6.5	-0.2
6.1.	Republic of Karakalpakstan	3.1	2.8	2.5	1.8	1.2	3.8	3.6	3.2	+0.1
6.2.	Khorezm region	3.6	3.8	2.8	1.9	1.6	2.6	3.0	3.3	-0.3

Source: compiled by the author based on data from the Statistical Agency under the President of the Republic of Uzbekistan (2025).

Tashkent region, including the city of Tashkent, is the leading industrial producer in the republic, accounting for 37-38% of the total. The restoration and modernisation of key industries such as coal mining, transformer engineering, crane manufacturing, telecommunications equipment, and electrical products (e.g., copper cables), along with the creation of thousands of small enterprises, have significantly strengthened the region's industrial potential. The city of Tashkent and the region remain the main industrial centres, leading in the number of operating enterprises and new facilities opened annually, which confirms their importance for the country's economy. The mentioned situation is related to the factor of industrial production concentration – infrastructural factors. The economic landscape – regions with developed, economically and geographically favourable infrastructures – have become growth poles. Due to the presence of industrial enterprises with potential for cooperation, convenient infrastructure, and a relatively large pool of qualified labour resources (two-thirds of the republic's higher education institutions are in Tashkent city and Tashkent region), about a quarter of newly established enterprises are annually located in Tashkent city and approximately 10% in Tashkent region.

As can be noted from the abovementioned information, there is a correlation between the industrial potential of the regions of the country and the newly created capacities. As noted, in regions such as Tashkent and Fergana provinces and the city of Tashkent, the number of industrial enterprises is large, the share of industry in the GDP is high, and regions with districts that are industry-forming (Karakalpakstan, Samarkand) have relatively high indicators.

It is possible to conclude that as the industrial potential of a region increases, the growth poles and concentration centres continue to attract new capacities until they reach a certain saturation point. In many cases, the distribution of productive forces in a region is ultimately limited by environmental factors. The number of industrial enterprises does not always correspond to the industrial potential of a region. For example, large enterprises such as the Navoi and Almalyk mining and metallurgical plants produce a few tens of percent of the region's total industrial output.

3.3 The role of large and small enterprises in regional development

Uzbekistan's growth poles, notably Tashkent and Fergana, exert a multifaceted influence on adjacent, less developed regions that extends beyond their core industrial functions. These urban-industrial centres act as nodes of economic gravity, generating quantifiable spillover effects through interregional input-output flows, technological diffusion, and labour mobility. In particular, backward and forward production linkages have led to increased demand for intermediate goods and services sourced from peripheral areas, thereby indirectly stimulating local economies. Technological transfer occurs via subcontracting arrangements, supplier networks, and the relocation of skilled labour trained in growth centres to secondary cities or rural districts. Furthermore, migration patterns demonstrate a centripetal dynamic: while rural-to-urban migration is dominant, there is also evidence of return migration from Tashkent and Fergana that facilitates the transfer of skills, entrepreneurship, and capital to underdeveloped regions. These mechanisms collectively contribute to the partial economic integration of lagging areas, though the magnitude and sustainability of such spillover effects remain uneven and require further empirical verification through regional input-output modelling and labour market analysis (Osei et al. 2024).

The national industry is not limited to large enterprises (Shtal et al. 2018). Given aspects such as employment and reduction of social tension in the regions, Uzbekistan has created powerful mechanisms for financing small businesses and private entrepreneurship. For example, 2011 was declared the year of small business and private entrepreneurship in the country (United Nations General Assembly 2011). In Uzbekistan, there was an excessive concentration of production in a few large centers, which limited economic mobility and self-employment opportunities in other regions. According to the United Nations General Assembly (2011), this initiative was part of a broader socio-economic development strategy aimed at supporting self-employment, expanding access to finance, deregulating entrepreneurial activity, and creating institutions to support small businesses. The same document states that as of 2011, small businesses accounted for more than 50% of employment in Uzbekistan's private sector, and their share of GDP was growing every year. State support included tax incentives, simplified lending, and the development of business infrastructure in the regions. Thus, declaring 2011 the Year of Small Business was not only a symbolic step, but part of a comprehensive state policy to strengthen socio-economic stability through the development of entrepreneurship.

In 2022, this sector accounted for 55-56% of GDP, 27-28% of industrial production, and 74.8% of employment in the economy. The index of the share of small businesses in the industry is high in Namangan, Samarkand, Jizzakh, Surkhandarya, Andijan regions, and the city of Tashkent. The index is low in Karakalpakstan, Kashkadarya, and Navoi provinces.

The small business industry was developed to a high level to address social problems in sparsely populated and densely populated areas. At the same time, its share is much lower in those regions where the processing industry and large enterprises are developed (Shurtan, Surgil gas and chemical complex, Navoi, and Almalyk mining and metallurgical plants). Industrial production in Uzbekistan is unevenly distributed across the country. Regions such as Karakalpakstan, Khorezm, Surkhandarya, Syr Darya, and Jizzakh have low levels of industrial production. To stimulate the growth of these areas, it is necessary to create attractive conditions for investment, develop joint ventures, and identify key growth points, which will form the basis for the dynamic development of the industrial sector.

Uzbekistan has great potential for the development of various industries, which requires a targeted approach to selecting priority areas (Anguelov & Kavaldzhieva, 2021; Herus, 2024). Such an approach is necessary for the effective formation and strengthening of the national economy. The development of only one industry in each region should not be limited to the development of only one industry. Industrial diversification and a balanced distribution of production capacities across the country contribute to the economic sustainability and diversity of regions (Bobir o'g'li 2023; Shkvarchuk & Slav'yuk 2024).

In Uzbekistan, the priority is the modernisation of industrial capacities and the active introduction of diversification principles aimed at developing a variety of industries (Buzhymska et al. 2024). In this respect, the Tashkent and Fergana regions are somewhat different. Machine building, ferrous and non-ferrous metallurgy, chemical, construction materials, light, and food industries are relatively well developed in the Tashkent region. At the same time, the level of industrial diversification is low in Karakalpakstan, Khorezm, and Syrdarya Provinces.

The concept of growth poles can be important in reducing regional imbalances in Uzbekistan's economic development by focusing efforts on creating and supporting economic centres that will serve as drivers of growth and development for the surrounding regions. To effectively apply this concept in Uzbekistan, several key aspects need to be considered. Regions with high potential for the creation of growth poles should be identified. These may be areas with promising industrial and natural resources, as well as regions where certain infrastructure or a base for further development already exists. Regions such as Tashkent, Fergana, and Navoi, which have already demonstrated significant achievements in industrialisation, as well as other less developed regions such as Karakalpakstan, Surkhandarya, and Khorezm, play an important role here. Suitable conditions need to be created in these regions to concentrate production capacity, innovative enterprises, and infrastructure projects that can become centres of attraction for investment and new jobs.

To effectively create growth poles, it is necessary to attract private and public investment by creating a favourable investment environment. This includes tax incentives, subsidies, support programmes for small and medium-sized businesses, and the development of public-private partnerships. In regions with high growth potential, technology parks, innovation centres, and research and production clusters should be actively promoted to foster the development of high-tech and high-margin industries, such as mechanical engineering, electronics, chemicals, and pharmaceuticals.

In addition, it is necessary to prioritise the creation of infrastructure that will support the development of growth poles and ensure their integration with other regions. This includes the development of transport networks, energy capacities, logistics centres, and digital infrastructure. Improvement of transport accessibility and communication networks will not only integrate remote regions into economic processes but also accelerate the exchange of knowledge and technology between growth poles and their surroundings (Rayevnyeva et al. 2025).

An important aspect is the creation and support of human resources for the growth poles. It is necessary to develop educational and research institutions in the regions and actively train qualified specialists for innovative and high-tech industries (Damyanov et al. 2021; Levchenko et al. 2021). At the same time, it is necessary to encourage the return of talented specialists from abroad and support the local population by creating conditions for entrepreneurial activity.

In addition, the effective implementation of the concept of growth poles requires a comprehensive approach to social policy. In regions where growth centres are being created, it is necessary not only to develop the economy but also to improve social infrastructure, including healthcare, education, housing, and social security. This will help create a balanced and sustainable development in which economic growth goes hand in hand with an improvement in the quality of life of the local population.

In conclusion, the use of the growth poles concept to reduce regional disparities in Uzbek economic development requires a comprehensive approach, including infrastructure development, investment attraction, creation of innovation clusters, and support for socio-economic initiatives. Strategic emphasis on these aspects will not only help to accelerate the economic development of the most lagging regions but also ensure the sustainable and balanced development of the country.

4. Discussion

The results of the study demonstrate a complex structure of industrial development in Uzbekistan's regions, determined by a combination of historical, economic, and institutional factors. One of the key trends is the high concentration of industrial production in a few leading regions, such as Tashkent, Navoi, and Andijan provinces. This confirms François Perroux's theory of poleward growth, according to which development is concentrated around large economic centres that attract resources and investment. However, this concentration creates imbalances that make it difficult for remote regions to develop.

A comparative analysis of the regional structure has shown that the share of industry in gross domestic product varies considerably. For example, in the Navoi region, industry occupies a key place in the regional economy, thanks to large mining enterprises and metallurgical plants. At the same time, in certain less developed regions, such as Surkhandarya and Khorezm regions, the share of industry remains low. This is due to both a lack of investment and infrastructure and relatively poor human capital development.

Prus & Sikora (2021) studied the impact of transport infrastructure on industrial development in different regions. The findings show that access to major transport hubs – railways, roads, ports – stimulates investment in industry, especially in sectors with high product mobility, such as light industry, food processing, and agricultural processing. The current study also emphasises the role of transport accessibility, but focuses on the heavy industry and mining sector. The author considers improving transport connectivity in regions with intensive industrial production to be a priority, while the current study focuses on developing transport corridors to stimulate growth in remote and less-developed areas.

The identified disparities highlight the need to strengthen government policies aimed at stimulating economic growth in peripheral regions. For instance, the development of transport and energy infrastructure, the creation of industrial zones, and the introduction of tax incentives to attract investors can be substantial in levelling regional differences. An example of the successful implementation of such measures is the creation of free economic zones (FEZs) in several regions, which have already demonstrated a positive impact on the development of local industry. Lu et al. (2019) analysed the effectiveness of free economic zones as instruments of accelerated industrial growth. The author concluded that free economic zones successfully attract foreign investment, increase exports, and create jobs, which is confirmed

by our data. For instance, Lee (2022) demonstrated that tax incentives in FEZs can significantly reduce the costs of enterprises, which is especially important for high-tech industries. However, the author also highlighted the lack of coordination between government agencies, which reduces the efficiency of FEZs. In addition to these factors, the current study focuses on the need for long-term planning and a strategy for attracting qualified personnel to FEZs, which is not mentioned in their work.

Considering the role of sectoral specialisation, it is possible to note that several regions are dominated by certain industries, which makes their economies vulnerable to external and internal shocks. For instance, a significant part of industrial production in the Andijan region is represented by the automotive industry, which increases the region's dependence on the situation in world markets and the stability of international supply chains. In this regard, diversification of the economy, especially through the development of high-tech industries and small businesses, is an important direction. Barbieri et al. (2020) studied the sectoral specialisation of regions and its impact on economic sustainability. The study emphasised that the excessive dependence of regions on one industry, for example, raw material extraction, makes them vulnerable to fluctuations in world prices. This conclusion is fully consistent with the current results, which point to the risk of overdependence. However, the author believes that economic diversification is impossible without active state intervention, including subsidies for new industries and state financing of large infrastructure projects.

Ivaldi et al. (2022) investigated the social and economic effects of industrialisation in the context of employment. The author argued that industrial growth favours regional employment, especially among young people. This coincides with the current findings on the positive impact of industrial growth on regional employment. However, the author also highlights the increase in social inequality: regions with developed industries have significantly higher wage levels than agrarian areas. The current study, on the contrary, emphasises the need to equalise the economic development of regions by stimulating growth in peripheral areas, which will reduce social and economic inequality.

Small businesses, as the study demonstrated, are essential for the formation of a sustainable economy. Its share in industrial production is increasing, which indicates the positive results of state support programmes. Nevertheless, entrepreneurs in the regions face several challenges, including administrative barriers, difficulty in accessing credit resources, and limited opportunities for innovation. Addressing these issues could be an important step to strengthening the contribution of small businesses to industrial development. Gherghina et al. (2020) analysed small and medium enterprises as a driving force of regional industrial development. The author emphasises that with limited access to credit resources, small enterprises have greater flexibility in adapting to market changes. Prieto-Sandoval et al. (2019) also revealed that administrative barriers such as the complexity of tax regulations and the need for multiple licences are major obstacles for small and medium enterprises. The current study also shows the importance of small and medium enterprise development, especially in regions with low industrialisation, but focuses on the limited availability of financial instruments and the lack of innovative initiatives.

The study emphasises the environmental aspects of industrialisation. The rapid development of industry in some regions leads to increased environmental pressure, which creates additional challenges for sustainable development (Madiyarova et al. 2015). For example, in the Navoi region, air and water pollution problems are associated with the intensive activities of mining and metallurgical enterprises. This emphasises the need for the introduction of "green" technologies and stricter control over compliance with environmental standards. Usman & Balsalobre-Lorente (2022) addressed the environmental consequences of industrialisation. The study addressed the regions of Central Asia with a high level of industrial activity, where intensive growth of production leads to deterioration of air, water, and soil quality. Karaduman (2022), in turn, demonstrated that carbon dioxide and toxic emissions in the regions can significantly exceed permissible standards, which requires intervention. Current results support their findings, especially in the context of environmental pollution. However, while the authors suggest that emphasis should be placed on the use of renewable energy sources (e.g., solar power plants), the current study notes that the greening of industry also requires the introduction of energy-efficient technologies and strict compliance with environmental regulations.

An analysis of government policy demonstrated that a significant step has been taken towards structural transformation. Economic modernisation and diversification programmes, export promotion, and foreign investment have become important tools for creating new growth points (Mamasydykov et al. 2019; Kubiczek 2020). However, there is still a need to improve coordination between different levels of government and to develop long-term strategies that consider regional specifics. Peng & Tao (2022) analysed the role of public policy in stimulating industrial growth, especially in developing regions. The study emphasised that successful industrial development is impossible without active government support, including tax incentives, subsidies for equipment modernisation, and measures to reduce administrative barriers to business. The current study also recognises the significant role of government policy in industrial development, but focuses on a different aspect: private sector involvement and cooperation between government agencies and large businesses to create innovative and competitive industries.

Thus, the results of the research indicate significant potential for further industrial development in the regions. However, achieving sustainable and balanced growth will require the integration of economic, social, and environmental factors into strategic planning, as well as the expansion of support measures for less developed regions of Uzbekistan.

5. Conclusion

Regional industrial development is a crucial element of economic policy, contributing to the strengthening of the economic structure and improving living standards. Theoretical models and practical initiatives in the field of industrialisation confirm that the concentration of production capacity, innovation, and investment in certain regions creates conditions for sustainable growth and infrastructure improvement.

An analysis of Uzbekistan's industrialisation shows a significant increase in regional industrial potential since independence. The increase in the share of industry in GDP from 16.2% to 26.7% between 2000 and 2022 demonstrates the diversification of the economy, which is the result of targeted government policy. An important role in this process was played by investments in natural resource processing, the development of the gas and chemical, and machine-building industries, as well as the active participation of small businesses, which account for about 27-28% of industrial production. This confirms that in recent decades there has been a growth and expansion of the sector, contributing to economic transformation.

The Uzbekistan 2030 strategy defines clear directions for increasing the added value of products, creating industrial zones, and stimulating cooperation between enterprises. The emphasis on the textile industry and high-tech production is intended to integrate the country into the global economy, which implies further development of key sectors and increased competitiveness in the international arena. An important component is also the development of intellectual potential and the creation of innovation clusters, which, in turn, can attract additional investment.

Nevertheless, an analysis of the territorial structure of industry shows significant differences in regional development. The high concentration of industrial potential in Tashkent and the Ferghana Valley poses challenges for less developed regions such as Karakalpakstan and Khorezm. Further decentralisation and support for small businesses in remote regions are needed to ensure sustainable growth.

Overall, Uzbekistan's experience confirms that the success of regional development depends on a balance between investment in large production centres and support for peripheral areas. Infrastructure modernisation, the development of small enterprises and clusters, and the application of evidence-based strategies are key factors contributing to the integrated development of regions and the creation of a sustainable economy.

A limitation of the study is the focus on quantitative indicators of industrial development without considering a detailed analysis of social and environmental factors affecting regional industrialisation. Further research could address the impact of modern technologies and sustainable practices on the development of the regional industry.

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