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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

ECONOMIC-GEOGRAPHICAL ASPECTS OF TERRITORIAL ORGANIZATION OF ECONOMIC ACTIVITIES IN THE GANJA-DASHKASAN INDUSTRIAL HUB

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GENERAL CHARACTERISTIC OF THE WORK

Relevance of the topic and degree of elaboration. During the period of independence, economic reforms have played a significant role in the development of economic sectors in the regions. As a result of the measures implemented, the activities of most existing production and service enterprises have been restored, and these enterprises have undergone technical and technological modernization to ensure the production of goods that meet modern standards.

Additionally, new economic facilities based on the use of local natural-geographical conditions and resources, as well as social and cultural service establishments catering to the population, have been established. These developments positively contribute to employment, increase incomes, and improve the standard of living for the population.

New directions are being implemented to ensure the efficient territorial organization of economic activities and foster the development of the non-oil sector in the country. Industrial parks, industrial zones, and joint ventures with foreign production companies are being established to meet the demand for local industrial products. Modern equipment, as well as technical and technological tools, are being introduced to support their operations.

Industrial hubs, implemented as one of the ways to ensure the efficient territorial organization of economic activities, offer favorable opportunities for reducing production costs, minimizing losses, and organizing machinery manufacturing enterprises based on cooperative relations. The use of infrastructure networks, the sequential processing of raw materials, and the organization of production at assembly machinery enterprises within industrial hubs can also contribute to the improvement of the economic structure in the city of Ganja.

The Ganja-Dashkasan industrial hub began to take shape in the mid-20th century with the establishment of a network of enterprises for the extraction and processing of non-ferrous metallurgy raw materials. At the same time, numerous industrial facilities operated in

the city to process agricultural products cultivated in the surrounding districts.

However, due to the challenges of the transition period, difficulties emerged in supplying these enterprises with raw materials. The cessation of alunite extraction in Dashkasan had a negative impact on the operations of the Aluminum Plant. Additionally, issues with electricity supply and high energy costs have created problems not only for existing enterprises but also for the newly built Aluminum Plant.

During the period of independence, alongside the restoration of operations at non-ferrous metallurgy enterprises in Ganja, significant steps were taken toward the establishment of ferrous metallurgy and machinery manufacturing enterprises. In addition to financial and technical support provided at the state level to complete these initiatives, developing the scientific and theoretical foundations for the efficient territorial organization of economic activities within the industrial hub remains a crucial task. Therefore, the dissertation is dedicated to a actual topic and holds theoretical and practical significance.

In the Republic of Azerbaijan, the territorial concentration and development of industrial complexes have been studied from various perspectives by economists such as A.A. Nadirov, S.K. Huseynov, F.A. Farajov, and others. Additionally, economic geographers including A.M. Hajizadeh, N.N. Allahverdiyev, H.A. Aliyev, M.A. Abramov, R.N. Mammadov, T.G. Hasanov, Z.N. Eminov, Ch.N. Ismayilov, N.A. Pashayev, Z.T. Imrani, E.S. Bedelov, and several other scholars have conducted research and published scientific works on different aspects of this issue.

On a global scale, the theory and practice of industrial complex formation, as well as the study of production and territorial complexes, have been explored by foreign economic geographers such as M.M. Kolosovsky, Y.G. Saushkin, I.V. Nikolsky, A.T. Khrushchov, V.M. Gokhman, I.M. Maergeyz, A.A. Mints, N.V. Alisov, M.I. Kozlov, A.E. Probst, H. McCarthy, E. Hoover, W. Isard, E. Otremba, A. Losch, J. Chardonnet, G. Pierre, and others.

The economic reforms carried out in Azerbaijan's industrial

sector require continuous scientific research to study the development characteristics of industrial hubs and to develop the scientific-theoretical and practical foundations for their role in the sectoral structure of the economy and the efficient territorial organization of industry across regions. The industrial hubs established in previous years, as well as the industrial parks and zones created in the modern period, have not been comprehensively studied across the regions in recent years.

In this context, the necessity of a comprehensive and economic-geographical study of the territorial organization and development problems of production in the Ganja-Dashkasan industrial hub in the modern period highlights the relevance of this dissertation.

Object and subject of the research. The primary object of the research is the Ganja-Dashkasan industrial hub, distinguished by its favorable economic-geographical, transportation, and trade position in the northwestern part of Azerbaijan. The hub, part of the Ganja-Dashkasan Economic Region, is the largest industrial hub in the country's west and shares borders with the Gazakh-Tovuz and Eastern Zangezur Economic Regions.

The territory of the industrial hub includes the city of Ganja, as well as Dashkasan and Goygol districts, covering an area of 2.08 thousand km². This constitutes 39.5% of the economic region's area and 2.4% of the total area of the country. As of 2023, the population of the hub is 428.8 thousand people, representing 4.2% of Azerbaijan's total population and 6.7% of its urban population[1]. The area encompasses 3 cities, 18 settlements, and 81 villages.

The subject of the research involves identifying the natural and economic foundations for the development of this industrial hub, studying the economic-geographical features of its efficient territorial organization, and determining the existing challenges to its sustainable development.

Purpose and objectives of the research. **The purpose** of the research is to study the modern economic-geographical foundations of the territorial organization of economic activities in the Ganja-

[1] Population of Azerbaijan – 2023. / State Statistical Committee of the Republic of Azerbaijan. – Baku: – 2024. – 140 pages.

Dashkasan industrial hub, identify ways to overcome the economic crisis that emerged during the transition period, and propose directions for the effective utilization of the region's natural and economic potential.

For this purpose, the following **objectives** have been set:

- Identify the advantages of developing economic sectors within industrial hubs and determine ways to utilize them effectively.
- Study the historical and geographical development features of the formation of the Ganja-Dashkasan industrial hub and propose solutions to address the problems that emerged during the independence period;
- Determine ways to restore the operations of economic facilities and improve their structure within the industrial hub, and explore opportunities for utilizing natural resources for this purpose;
- Strengthen the industrial hub’s economic potential through the organization of agricultural product processing by expanding connections with surrounding areas, and highlight the importance of enhancing the role of social and cultural facilities in serving the population of nearby districts;
- Analyze the impact of measures taken during the period of economic reforms on improving the economic structure of the industrial hub and identify directions that need to be implemented in the future.
- Study the significance of strengthening the industrial hub's economic potential in terms of increasing employment, raising living standards, and maintaining demographic potential in local areas, and develop relevant proposals and recommendations.

Research methods. The theoretical and methodological basis of the research is formed by the works of Azerbaijani and foreign scholars dedicated to studying industry, principles of its territorial organization, and the role of natural and economic factors in its development. The scientific and practical provisions from the State Programs on the socio-economic development of regions and specific sectors in Azerbaijan were used in the analyses conducted for the dissertation.

During the preparation of the dissertation, various methods were used, including statistical analysis, historical-geographical approach, cartographic method, geographical synthesis, system-structural approach, comparative analysis, and others.

The main provisions of the defense. The following provisions are presented for discussion during the defense of the dissertation:

- The importance of industrial hubs in the efficient territorial organization of economic activities, the regulation of production, socio-cultural, and demographic relationships within them, and their impact on the development of the region;
- Ways to efficiently utilize the natural-economic and demographic foundations of the formation of the Ganja-Dashkasan industrial hub, as well as the importance of these factors and urban settlement in improving the economic structure of the region;
- The modern structure of the economy in the Ganja-Dashkasan industrial hub, the variety of produced goods and services, and their significance at the regional and national levels;
- Directions for the efficient territorial organization of the economy within the industrial hub and the role of State Programs implemented in this area.

Scientific novelty of the research. The following can be attributed to the scientific novelty of the dissertation:

- The natural-geographical conditions and natural resources determining the formation of the Ganja-Dashkasan industrial hub have been evaluated from an economic-geographical perspective, and the potential for their utilization in the current context has been determined;
- The development of urban settlements, the increase in urbanized areas, the location of urban residential areas, as well as the labor resources of cities, human resource potential, and other factors that accelerate the formation of industrial hubs have been studied;
- The main directions for improving the sectoral and territorial structure of the economy within the industrial hub and the importance of these measures for the socio-economic and demographic development of the area have been substantiated;

- The necessity of creating interconnected sectors to achieve efficient territorial organization in the Ganja-Dashkasan industrial hub has been demonstrated, and directions for utilizing local raw materials and semi-finished products have been identified;

- The economic-geographical analysis of the current state of the transport-communication network, which is the basis for the formation of industrial hubs, has been carried out, and priority development directions have been developed;

- The role of the implemented State Programs in the development of the industrial hub has been studied, and recommendations and proposals have been made to increase the region's share in the country's development.

Theoretical and practical significance of the research. The analyses conducted during the research process and their outcomes, along with theoretical recommendations, will play a significant role in the efficient territorial organization of economic sectors in the Ganja-Dashkasan industrial hub, settlement of the population, provision of employment, and fulfillment of social-cultural service tasks. The recommendations provided may be important for the restructuring of the economy in other industrial hubs of the country. At the same time, the analyses and collected data serve as crucial sources used in the educational process at higher and secondary educational institutions. The provisions in the dissertation are valuable sources for the economic and socio-demographic development of the regions.

Approbation and application. The main results of the analyses conducted in the dissertation have been presented at the following international and national conferences: The VIII International Scientific-Practical Conference on "Development of Agricultural Science, Food Security, and Environmental Protection through International Cooperation" (Ganja, 2016), Scientific Conference on "Demographic Development in the Republic of Azerbaijan: Prospects of Population Settlement and Regional Issues" (Baku, 2016), Scientific Conference on "Human and Environment Relations" (Baku, 2017), International Scientific-Practical Conference on "Water Resources, Hydrotechnical Structures, and

Environment," "AzərSu" ASC (Baku, 2017), Republican Scientific-Practical Conference on "Global Economic Conditions and Azerbaijan's Economic-Geographic Position" (Baku, 2017), International Scientific-Practical Conference on "Modernization in the Context of the Updated Content of Natural Science Education" Kazakhstan Geographic Institute (Almaty, 2017), and others.

10 scientific articles and conference materials related to the research topic have been published.

In the dissertation, the proposals and recommendations for the development of the Ganja-Dashkasan industrial complex's economy can be used in the formation of the country's industrial complex, in regional employment, and in the creation of service infrastructure. They can also be valuable for the preparation of state programs, attracting investors to the region, as well as in the annual work plans of municipal and local executive authorities. Additionally, these suggestions could be applied in the Ministry of Economy, Ministry of Labor and Social Protection of Population, and other relevant ministries.

The name of the organization where the dissertation work was carried out: The dissertation work was carried out at the Department of Geography, Ganja State University, Ministry of Science and Education of the Republic of Azerbaijan.

Structure of the dissertation. The dissertation consists of an introduction, four chapters, a conclusion, and a list of references. The total volume of the work is 155 pages, which includes 8 figures, 24 tables, and a list of 142 references. Introduction is 7 pages, Chapter I is 45 pages, Chapter II is 35 pages, Chapter III is 30 pages, Chapter IV is 22 pages, Conclusion and recommendations are 3 pages, and the References section is 10 pages. The dissertation has a total of 238,264 characters, excluding tables, graphics, figures, and references.

BRIEF CONTENT OF THE DISSERTATION

In the introduction, the relevance of the topic, the research purpose, objectives, theoretical and methodological foundations are

outlined, and the scientific novelty and practical significance are explained.

The first chapter reflects the importance of industrial hubs in territorial organization of the economy and the theoretical-methodological foundations of their study. Settlements formed based on the concentration of economic sectors and population develop rapidly through the utilization of the natural conditions of surrounding areas, the exploitation of natural resources, and the functioning of production enterprises that are based on the processing of agricultural products cultivated in the region.

The share of different sectors in the economic structure of cities is determined by various factors. In the early stages, natural-geographical factors play a leading role, but in subsequent phases, the impact of socio-economic factors becomes more prominent. These factors include the exploitation of large mineral deposits, the operation of large-scale light and food industry enterprises for processing agricultural products, the functioning of metallurgy, machine-building, chemical, and petrochemical enterprises based on raw materials and semi-finished products derived from the primary processing of minerals, the location of settlements at transportation hubs, and the economic-geographical position, among others.

Currently, the analysis of the distribution of industrial objects across regions in the country and the production of industrial goods in these enterprises shows that there are significant regional discrepancies. Despite large-scale measures being implemented to address this issue, the results have been weak, and the share of the regions in the country's economic potential remains low. In the development process that began in the 1970s, based on the formation of the material and technical base in the regions, the share of industrial production in the Aran and Ganja-Gazakh economic regions was 12% and 8% respectively in the 1980s, and in 1990, it reached 17% and 11%. As a result of changes in the territorial organization of the country's industrial structure, starting from the late 20th century, the oil and gas industry took the leading role, and its share increased rapidly. In 2005, the share of this sector was nearly 67%, and in 2010 and 2022, it was 72.0%. However, in recent

years, the revenues generated from this sector have been weakly reinvested in the development of other sectors of the economy. The analysis of the distribution of the sectoral and territorial structure of industry across the regions in the country shows that there are significant discrepancies in this area in different economic regions. As a result, the share of industrial production in the leading regions, Aran and Ganja-Gazakh, has decreased to 2.6% and 1.6%, respectively. The underdevelopment of the regions leads to their participation in industrial production with only a few percentage points. The share of the Baku and Absheron Economic Region in this sector has increased, reaching 92.8% in 2022. One of the main reasons for the sharp disparities between the industrial production of the country's regions and Absheron is the slow development of other industrial sectors, namely the non-oil sector. Thus, from 2010 to 2022, the value of manufacturing industry output increased by 3.2 times, in parallel with the extraction industry. This process demonstrates that the implemented measures have yielded some results, but significant challenges remain in this sector.

In the republic, extensive research has been conducted on the formation of the sectoral and territorial structure of industry, the natural-geographical factors influencing its development, and the scientific-theoretical foundations for the use of the existing economic-geographical potential. These studies gained broader scope during the 1970s and 1980s. In the second half of the 20th century, the establishment of a new network of industrial facilities in Azerbaijan and the construction of new production and service enterprises in the regions were aimed at promoting the complex development of the industry. These factors were considered crucial measures to prevent the concentration of population and industry in the Absheron region[2].

In the conducted research, alongside the study of individual sectors of industry, the directions for its complex development and the efficient organization of sectoral and territorial structures have also been addressed. In Azerbaijan, the study of industry is carried

[2] Gadzhizade A.M. Azerbaijan’s Industrial Complex. – Baku: Azerneshr, – 1975, – 204 pages.

out not only by republican scientists, but also by scientists living in Russia, Ukraine and other foreign countries. The consideration of their findings has had a significant impact on the more efficient territorial organization of industry.

In the process of locating economic objects, numerous natural-geographical and socio-economic factors are taken into account. Currently, in the territorial organization process of production and service sectors, the influence of economic, economic-geographical, technical, and technological factors is coming to the forefront.

After Azerbaijan gained independence, alongside economic reforms in various sectors, integration into the global economy was also among the key tasks.

Establishing a market-oriented economic system, adapting its management to modern requirements, implementing privatization, and creating enterprises based on private, foreign, and joint ownership capable of participating in international markets were necessary. A significant portion of these tasks has already been completed.

One of the directions for organizing the territorial arrangement of economic sectors within the country is ensuring complex development. To achieve this, it is necessary to place enterprises that are interconnected in terms of production-technical processes and the use of labor resources in close proximity to each other. In the process of complex industrial development, mineral raw materials and agricultural raw materials are technologically processed in a sequential manner, with raw materials being processed in a comprehensive manner through all stages of production in a single enterprise or in several neighboring enterprises. At the same time, the creation of industrial complexes provides favorable conditions for the processing and utilization of waste, residues, by-products, and raw materials generated during the production process.

In Azerbaijan, the leading economic regions and industrial hubs that play a significant role in the formation of the sectoral and territorial structure of industry include Ganja-Gazakh and Ganja-Dashkasan. Over the past 20 years, the value of products in the overall production sectors and the investments directed towards fixed

capital have increased significantly, while the share of industrial product production in terms of value has decreased (Table 1).

Table 1

The main socio-economic indicators of the Ganja-Gazakh economic region and the Ganja-Dashkesen industrial hub, and their shares in the country (%)

Indicators	Ganja-Gazakh ER			Ganja-Dashkasan İH		
	2003	2013	2023	2003	2013	2023
Population number	13,5	13,0	12,5	3,7	3,5	3,3
Urban population	12,1	11,2	10,7	7,3	6,8	6,0
Value of production in general sectors	2,1	4,2	3,7	0,9	1,2	1,0
Funds directed to fixed capital	0,6	5,3	3,3	0,1	2,0	1,0
Industrial products	2,6	1,6	1,6	1,1	0,9	1,0
Retail trade turnover	4,1	8,8	7,8	3,1	2,9	3,0
Housing Commissioned (in thousand m²)	170,9	336,9	120,6	24,6	120,4	27,8
Population income	-	8,7	7,9	-	3,3	2,8
New Jobs (in thousand people)	4,6	9,2	2,1	2,6	3,2	0,9

Source: State Statistical Committee of the Republic of Azerbaijan[3] [4] [5]

In the years of independence, within the framework of the State Programs aimed at ensuring the socio-economic development of regions, large production enterprises were established in the country. However, most of them consist of individually operating entities. As a result, in many cases, the enterprises cease operations after a short period, and difficulties arise in restoring their activities.

Agglomerations are often formed as industrial hubs, and the cities and towns within them are closely interconnected through economic, production-technological, and infrastructural links. In the process of complex industrial development, mineral resources and

[3] Regions of Azerbaijan - 2004. / State Statistical Committee of the Republic of Azerbaijan. – Baku: – 2005. – 713 p.

[4] Regions of Azerbaijan - 2015. / State Statistical Committee of the Republic of Azerbaijan. – Baku: – 2015. – 836 p.

[5] Regions of Azerbaijan - 2023. / State Statistical Committee of the Republic of Azerbaijan. – Baku: – 2024. – 788 p.

agricultural raw materials are processed sequentially from a technological standpoint[6].

Thus, the formation of industrial hubs in the country is crucial for the efficient territorial organization of industry and holds particular significance in this regard. Industrial hubs are formed under conditions of their complex development. This becomes possible through the implementation of important measures aimed at restructuring the economic structure in specific areas, leading to the creation of a complete series for the processing of natural resources and agricultural products.

The second chapter examines the impact of natural-geographical factors on the development of industrial hubs. In the territorial organization of economic sectors, the creation and expansion of a new network of facilities, the establishment of connections with surrounding areas, the provision of enterprises with raw materials and semi-finished products, and the transportation of finished goods, the natural-geographical environment plays a significant role. The relief conditions are also of great importance in the formation of the Ganja-Dashkesan industrial hub. In the relatively gently sloping areas of the Ganja-Gazakh plain, there are favorable conditions for the establishment of cities and rural settlements, the creation of transport-communication networks, and the conducting of agricultural activities.

Climate conditions and agro-climatic resources are of particular importance in the development of the area. The temperature of the air plays a significant role in the development of territories, the conduct of agricultural activities, and the selection of specialization directions.

The objects belonging to the inland water network in the Ganja-Gazakh region have a significant impact on the territorial organization of economic sectors and the settlement of the population. Most of the right tributaries of the Kura River, which originates from the region, flow through the country. These include the Zayam, Shamkir, Goshgar, Ganja, Kurak, Goran, and Inja rivers.

[6] Alayev, E.B. Social and Economic Geography. Conceptual and Terminological Dictionary / E.B. Alayev. – Moscow: “Mysl”, – 1983. – 350 p.

The Aghstafa, Tovuz, and Hasansu rivers originate from the territory of Armenia and flow into Azerbaijan in their lower courses. The rivers are generally swollen during the spring and early summer due to the melting of snow in the mountains and intense rainfall. The Mingachevir and Shamkir reservoirs on the Kura River are of great importance.

The region is well-endowed with mineral resources. The spread of various types of rocks in the Lesser Caucasus mountains allows for the distribution of iron ore, alunite, polymetallic ores, gold, copper, and mercury ores in the area. At the same time, there are significant reserves of barite, marble, sand-gravel, and gypsum deposits in the region (Figure 2).

Among the most important and significant natural resources in the country's industry are the iron ore reserves in the Dashkasan region. Iron ore deposits have been identified in the Dashkasan, South Dashkasan, and Demirli fields. During the years of independence, serious issues arose in this sector, leading to the suspension or very limited extraction of iron ore. To resume iron ore production in the country, there is a need for the construction of a modern metallurgy plant in nearby cities, such as Ganja or Dashkasan. Construction of a modern metallurgy plant has already begun in Ganja.

In the Ganja-Gazakh region, another significant industrial mineral resource is the alunite deposits located in the Dashkasan district. Alunite, a crucial raw material for the non-ferrous metallurgy industry, is found in the Zayem deposit of the Dashkasan district. Based on the use of its reserves, an aluminum plant was built in Ganja, where the initial processing was organized. The final product was obtained, and the purification of aluminum oxide was carried out at the Sumgait Aluminum Plant. However, due to the high cost of electricity and the inefficiency of exporting it to the global market, the three aluminum plants in the country are unable to operate at full capacity.

In the Dashkasan district, the North Dashkasan deposit contains cobalt, while in the Goygol district, manganese ores have been identified in an area called Molla Jalil. Numerous auxiliary

materials are used in the ferrous metallurgy industry. Among them, flux limestone is located in the Khoshbulakh deposit in the Dashkasan district. The bentonite clay reserves in the Dash Salakhli deposit in the Gazakh district and in the Qaymaqli deposit in the Goygol district could be utilized in this sector.

The Ganja-Gazakh economic region has numerous mineral raw material sources that can supply the chemical industry. Among them, barite reserves stand out due to their significance. Barite deposits are concentrated in the Bashkishlag, Chovdar, and Chirakdere fields. In the Goygol district, there are sulfur pyrite reserves near the villages of Toganali and Murut. There is significant potential for utilizing these deposits. However, the establishment of specialized processing plants is required for this purpose. If the demand for products from these raw materials arises in the country's industrial enterprises, the creation of such plants becomes feasible. The region's nationally significant mineral construction materials include marble reserves in the Dashkasan district, gypsum in the Yukhari Agjakand field of the Goranboy district, and limestone deposits in Gazakh, Zayam, Agdag, and Murut. In the Gadabay district, copper pyrite reserves are concentrated in the Qaradag and Bitti-Bulag fields, which were utilized by Germany's Siemens Company in the 19th century. Copper smelting plants operated near the village of Galakand. Polymetallic ore reserves have also been identified in the Chovdar field of the Goygol district and in the Dashkasan district. Currently, gold processing plants in Gadabay and Dashkasan operate based on the utilization of these resources.

The development of industry plays a "locomotive" role in urban settlement. Industrial complexes become key support centers within regional systems and act as hubs in settlement networks. Ganja serves as such a central hub in the western zone of the country, concentrating 25.9% of the population and 70.5% of the urban population of the Ganja-Gazakh economic region. The city of Ganja plays a major role in the high level of urbanization (71.2%) of the Ganja-Dashkasan economic region. The city's labor resources and workforce potential are key factors accelerating the formation of the industrial hub. During the independence years, an analysis of the

main trends in the demographic development of Ganja reveals a decline in its dynamics. These processes have the potential to lead to the emergence and deepening of a demographic crisis, making it necessary to implement urgent action plans at the state level.

The third chapter examines the modern territorial organization of industry and the transformations during the years of independence. Industry plays a crucial role in the economic structure of residential settlements within the Ganja-Dashkasan industrial hub. The enterprises within this hub impact employment and primarily produce goods to meet domestic demand. During the transition period, there were serious difficulties in the operation of production and service facilities in various industrial sectors of the region. However, as a result of implemented measures and the fulfillment of the "State Programs for the Socio-Economic Development of Regions," many of these enterprises have resumed operations, and new facilities have been constructed when necessary.

The number of industrial facilities in the economic region is constantly changing. During the years of independence, the number of production facilities belonging to the Agro-Industrial Complex has significantly increased, most of which are located in urban areas. As a result, the improvement and development of the economic structure in the Ganja-Dashkasan industrial hub continue to this day. In 2022, the share of the industrial hub in total industrial production for the economic region was 58.3%, while it accounted for 70% in the manufacturing sector and over 51% in the extraction industry. In the modern era, two districts stand out in the territorial organization of industry. In the Gazakh-Tovuz Economic Region, the leading areas by share in the industrial territorial structure are Gazakh (37.1%) and Gadabay (35.9%), while the shares of other districts are relatively small. The Ganja-Dashkasan Economic Region is distinguished by the fact that the share of the manufacturing industry is three times greater than that of the extraction industry. In terms of territorial organization, Ganja city (65.7%) and Dashkasan district (22.4%) hold the leading positions, while other districts have very low shares. The industrial map of the economic region provides detailed

information on the territorial and sectoral composition of industry (Figure 1).

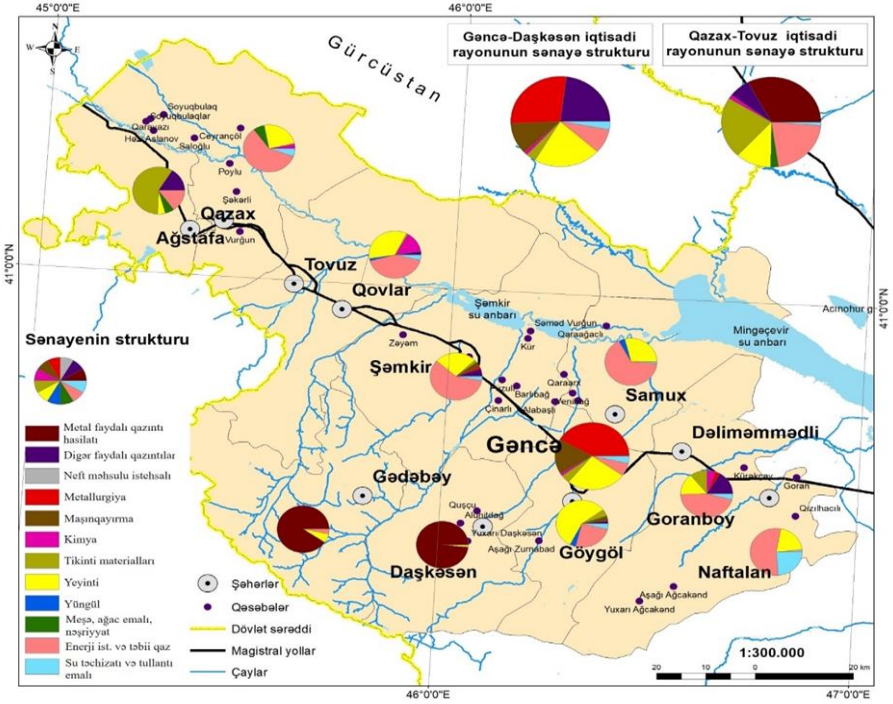

Figure 1. Territorial organization of the industry of the Ganja-Gazakh economic region

Ensuring proportionality in the sectoral structure of industry plays a fundamental role in shaping the region's economy and serves as a key element of the country's regional policy. The formation and development of territory at the regional level largely depend on the correct resolution of this issue. In the research region, the priority sectors of industry are manufacturing and extraction. Over the past 20 years, analysis indicates that the share of the extraction industry, particularly in metal ore production, has significantly increased. Although the value share of manufacturing initially grew during the first decade, it later stabilized. Within the manufacturing sector, metallurgy and mechanical engineering have been the leading fields. Despite their rapid initial growth, a declining trend has emerged in recent years. The share of the food industry, which had drastically

decreased, has doubled over the past five years. Additionally, the share of the construction materials industry has increased more than tenfold in the same period.

Table 2

Changes in the sectoral structure of ındustry in the Ganja-Gazakh Economic Region (%)

Industrial sectors	Years			
	2000	2005	2012	2022
Extraction Industry, including	**1,7**	**1,0**	**25,4**	**28,4**
Extraction of fuel minerals	0,1	-	-	-
Mineral construction materials	1,6	1,0	4,9	2,9
Metal ore extraction	-	-	20,5	25,5
Manufacturing ındustry	**56,3**	**78,3**	**56,3**	**56,3**
Metallurgy	0,8	54,5	29,4	18,2
Mechanical engineering	1,4	3,1	14,7	7,7
Chemistry	29,6	0,4	0,5	1,2
Construction materials	0,3	2,0	1,0	9,7
Food ındustry	22,8	16,3	8,8	18,4
Light ındustry	1,0	1,3	1,4	0,3
Forestry, wood processing, publishing	0,3	0,4	0,4	1,1
Other Sectors	0,1	0,3	0,1	
Electricity and natural gas production	**42,0**	**20,7**	**15,5**	**13,0**
Water supply and waste processing			**2,8**	**2,3**
Total	**100,0**	**100,0**	**100,0**	**100**
Industrial enterprises	164	284	269	311
Industrial workers (persons)	20181	15798	14038	34615

Source: State Statistical Committee of the Republic of Azerbaijan [7] [8] [9]

Metallurgy plays a leading role in the formation of the Ganja-Dashkasan industrial hub, with the non-ferrous metallurgy sector taking precedence. To utilize the alunite deposits located in Dashkasan district, an aluminum plant was constructed in Ganja city. In this facility, alunite underwent initial processing. After purification, the alunite mined in Dashkasan was preliminarily

[7] Industry of Azerbaijan - 2007. / State Statistical Committee of the Republic of Azerbaijan. – Baku: 2008. – 574 p.

[8] Industry of Azerbaijan - 2014. / State Statistical Committee of the Republic of Azerbaijan. – Baku: 2015. – 344 p.

[9] Industry of Azerbaijan - 2022. / State Statistical Committee of the Republic of Azerbaijan. – Baku: 2023. – 213 p.

processed at the Ganja Aluminum Plant to produce aluminum oxide (Al_2O_3, clay-soil). The production of pure aluminum metal was carried out in Sumgait city. Due to challenges in utilizing by-products and the low content of valuable elements in the mineral (20-21%), the extraction of pure aluminum from domestic raw materials was deemed inefficient. As a result, the operation of the Ganja Aluminum Plant was partially restored using imported raw materials.

In the years of independence, due to the issues in utilizing local raw material deposits, a new factory was established in Ganja city with the aim of producing pure aluminum metal using imported bauxite. Currently, non-ferrous metallurgy enterprises in the country are under the control of "Det-Al Holding" Company. The foundation of a new aluminum plant was laid in Ganja city in 2008, and its initial phase was commissioned in 2011.

In recent years, the rapidly developing machine engineering industry in the country has become crucial for the production of individual components and spare parts, as well as for acquiring additional parts. The steel products produced will also provide the necessary raw materials for the Automobile Plant in Ganja city, enabling the establishment of new machine engineering factories.

Machine engineering, as the most important urban-generating factor, plays a leading role in utilizing labor resources, generating income, and increasing export potential. In Ganja city, machine engineering is represented by several enterprises. Although specific products are not constantly produced here, goods are manufactured to meet the country's demand for various machines and equipment.

The goal of constructing an explosives production plant in Ganja city by the founders of "AzerBlast" LLC was related to its proximity to the country's main mining industry center. This facility will produce products based on the assessment of local demand and export potential.

One of the underdeveloped sectors in the Ganja-Dashkasan industrial hub is the light industry. The region has sufficient raw material base, inexpensive labor force, and consumer potential for the development of this sector. Over many years, Ganja city had numerous enterprises in this field. However, raw material shortages,

outdated technological equipment, and difficulties in selling products led to the closure of these enterprises.

The share of sectors within the industrial structure of the Ganja-Dashkasan industrial hub has been changing continuously. The share of industrial products and extraction industries in terms of value is more than half for the economic region, while the share of metal ore extraction in the country accounts for 56.6%. Although the share of the manufacturing industry is high in the economic region, it stands at only 3.1% for the country. However, certain specialized industrial sectors, particularly metallurgy (17.2%) and machine engineering (7.7%), have higher shares, while the share of other sectors is relatively lower (Table 3).

Table 3

Specific weight of the Ganja-Dashkasan Industrial Hub in the industrial structure of the country and the economic region. 2022 (mln. manat and %)

Sectors	Azerbaijan	Ganja-Gazakh E.R.	Ganja-Dashkasan I.H.	Ganja-Gazakh E.R. and share of I.H. by country, %	
Extraction industry, including	64745,3	402,2	205,8	51,2	0,3
Metal Ore Extraction	361,4	361,4	204,5	56,6	56,6
Other minerals	180,3	40,9	1,3	3,2	0,7
Manufacturing industry, including	18116,4	798,4	559,0	70,0	3,1
Metallurgy	1482,6	258,0	255,2	98,9	17,2
Mechanical engineering	1344,8	109,1	103,9	95,2	7,7
Chemistry	2335,0	17,0	7,8	45,9	0,3
Construction materials	1082,3	136,9	25,4	18,6	2,4
Food industry	6222,8	256,9	162,3	63,2	2,6
Light industry	576,2	4,8	1,3	27,1	0,2
Wood, furniture, etc.,	537,3	15,7	3,2	20,4	0,6
Other sectors	98,5	0,4	0,2	50,0	0,2
Electricity and natural gas production	3016,3	184,0	39,5	21,5	1,3
Water supply and waste processing	505,4	33,1	22,2	67,1	4,5
By industry	86383,4	1417,7	826,5	58,3	1,0

Source: State Statistical Committee of the Republic of Azerbaijan [10].

[10]Industry of Azerbaijan - 2022. / State Statistical Committee of the Republic of Azerbaijan. – Baku: 2023. – 213 p.

Ganja city has been a center of non-ferrous metallurgy and machine engineering enterprises for many years.

In the industrial hub, there are few agricultural processing facilities. Establishing production lines for fruit juices, canned goods, and table waters is crucial. The light industry enterprises within the Agro-Industrial Complex are also limited in the region. Additionally, it is necessary to modernize sectors such as electricity generation, steam production and supply, water supply, and waste treatment to meet contemporary standards and demands.

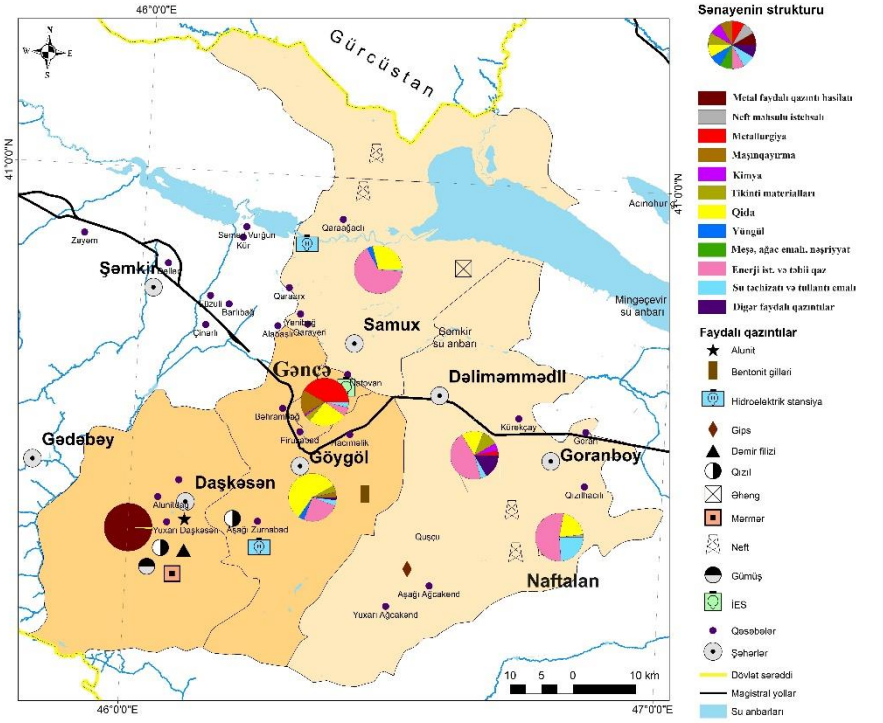

Figure 2. Industrial structure and mineral resources of the Ganja-Dashkasan Economic Region and Hub

The analysis of the industrial development dynamics in Ganja city during the independence years, the main results of the economic reforms, and the current situation shows that the manufacturing industry holds a leading position.

Currently, in the structure of Ganja's industry, the production of building materials, wood and wood processing, including furniture production, has a relatively low share. Continuing measures to increase their share is among important tasks.

The analysis of the sectoral structure of industry and the current state of territorial organization in Dashkesen district reveals that despite its rich natural resources, the sector has underdeveloped and exhibits a monostructural character. There are no enterprises for processing iron ore and alunite, and therefore no production is carried out. Recently, with the launch of the Gold Plant, the extraction industry has become a leading sector. Due to the weak power of the processing industry objects in the district, the activities of a single enterprise define the sector's structure. It is essential to establish enterprises based on the utilization of local resources and potential for the development of the industry.

The weak economic base of Dashkesen city and surrounding settlements has led to serious problems in the demographic development of the area. The weak economic base also poses a barrier to social development.

In the fourth chapter, the priority directions for the development of the Ganja-Dashkesen industrial hub are explored. The development of industry in the Ganja-Dashkesen industrial hub benefits from the natural and geographical conditions, potential reserves of natural resources, the possibility of their utilization, the transport and communication network, and demographic potential. In the near future, it is crucial to establish new Thermal Power Plants around Ganja city to meet the electricity needs of the newly created industrial objects.

The region's plain areas, such as the Ganja-Gazakh plain and Jeyranchol, offer great potential for the installation of solar power systems (HelioES) due to the long duration of sunny hours. Therefore, one of the ways to increase electricity production is by utilizing this natural-economic potential. In Ganja, an agreement has been reached for the establishment of a plant that will produce electric locomotives in cooperation with Swiss wagon-building companies. The launch of this plant in the city can be considered an

important step in the development of this leading industry sector in the country.

In the process of economic reforms in the country, the reconstruction of socio-cultural facilities, improvement of the services they provide, elimination of territorial organization issues, and the establishment of new networks of facilities are set as crucial tasks. The measures taken should aim at reducing regional disparities in the services provided. At the same time, it is necessary to minimize the differences in the variety and value of services between cities and rural settlements.

The analysis of the territorial organization and provision of infrastructure sectors in the Ganja-Dashkasan industrial hub shows that most indicators are below the national averages, and the provided services fall short of modern requirements. Therefore, the construction of new service facilities and the improvement of service quality are necessary. These measures would contribute to the creation of new jobs and the increase in the population's income. The diversification of the industrial sectors of the industrial hub could play a decisive role in enhancing the country's competitive capabilities and in the formation of a sustainable economy.

Ganja city is a key center in the western region of the country, concentrated with economic, socio-cultural, and demographic potential. The analysis of the main trends in the demographic development of Ganja city during the years of independence shows that there have been regressions in their dynamics, and these processes continue. The problems related to the provision of employment for the city's population, the inability of existing machine-building and metallurgy enterprises to operate at full capacity, and the closure of most of the jobs have negatively affected the formation of incomes, causing a significant decrease. These issues have led to a decline in the standard of living, resulting in difficulties in providing adequate housing conditions.

The analysis of the economic structure of Ganja city shows that although there has been a significant decline in the activities of enterprises in sectors such as metallurgy, chemistry, light industry, and food industry, which have played an important role for many

years, a renewal process is currently taking place. New production directions are being created in the activities of the Ganja Machine-Building Plant. To make efficient use of the city's economic and socio-demographic potential, it is essential to expand the activities of enterprises in metallurgy, machine-building, and chemical industries, as well as to establish enterprises that process agricultural products.

CONCLUSION

1. The analysis of the sectoral and territorial structure of industry in the country reveals significant disparities across economic regions. The dominant position of the oil and gas industry and the weak development of regions result in their contribution to industrial production being limited to just a few percent. Despite development programs being implemented, serious issues persist in this area. Therefore, it is necessary to take measures to process agricultural products and utilize local natural resources efficiently. (4,10)

2. The historical and geographical analysis of Ganja, a regional center city of Azerbaijan, shows that over a long period, it has played a leading role in the management of the country's economy, the improvement of the territorial-industrial structure, and the development of the Ganja-Gazakh economic region. As a city with industrial, transportation, trade, science, education, cultural, and other functions, Ganja also serves as the main hub for productive forces in the western part of the country. Ganja city accounts for 25.9% of the Ganja-Gazakh economic region's population and 70.5% of its urban populationBeing the second-largest agglomeration in the country, Ganja's population exceeds that of the core city by more than double. Ganja city has played a central role in the formation urbanized areas in the region, which is why the urbanization level in districts surrounding the city has remained high. (2)

3. The formation of industrial hubs in Azerbaijan is essential for the efficient territorial organization of industries and holds particular significance for the area. Industrial hubs are formed in the conditions of their complex development. The sectoral structure of the Ganja-Dashkasan industrial hub continues to evolve, with notable

fluctuations in the share of various industrial sectors. Although the production and extraction industries account for over half of the economic region's total industrial output, their share in the country's overall figures stands at just 1%. The processing industry holds a 70% share within the region but only 3% at the national level. However, specialized industrial sectors such as metallurgy and machinery manufacturing demonstrate relatively higher contributions, at 17.2% and 7.7%, respectively. Despite this, the shares of other sectors remain low. Efforts are being made to restructure the industrial framework, focusing on establishing complete industrial cycles for processing natural resources and agricultural products. The development of cities that are in the formation stage and have this potential are important measures for the sustainable development of industry in the regions.(7)

4. The analysis of the main trends in the demographic development of the city of Ganja during the years of independence shows that there have been setbacks in their dynamics and these processes continue. Challenges in ensuring employment for the city's population, the inability of existing machinery manufacturing and metallurgical enterprises to operate at full capacity, and the closure of the majority of workplaces have had a negative impact on household incomes, leading to a significant decline. Consequently, this situation has lowered the standard of living, creating difficulties in housing provision and causing a decline in marriage rates. (5)

5. The analysis of the economic structure of Ganja city indicates that enterprises associated with metallurgy, chemical, light, and food industries, which have played a significant role for many years, have experienced a serious decline. The operations of the Ganja Machinery Plant are not fully functional, and the establishment of new production and service facilities is progressing at a slow pace. Their privatization is not being carried out. The process of economic reforms has so far shown limited positive outcomes in improving the economic structure. Therefore, to efficiently utilize the city's economic and socio-demographic potential, it is necessary to expand the operations of metallurgy,

mechanical engineering, and chemical industry facilities, as well as establish enterprises for processing agricultural products. (1,7)

6. The analysis of the current territorial organization of industry in the Ganja-Dashkasan industrial hub indicates that most large-scale production facilities, particularly non-ferrous metallurgy enterprises, have weakened operations, while the extraction of iron and alunite ores has stopped in the Dashkesan region. Due to weak internal energy production in the region, challenges arise in the operations of aluminum smelting plants. The Ganja Automobile Plant is engaged in assembling various types of machinery. For the plant's sustainable operation, the establishment of specialized production sectors is essential. (2,5,9)

RECOMMENDATIONS

The research on improving the functional structure of cities has led to the conclusion that the following proposals and recommendations are appropriate solutions to the problem:

The establishment of industrial parks and clusters in the Ganja, efficient and effective placement of production, and the implementation of complex state measures to bring the level of social infrastructure development in line with modern standards would be beneficial.

The analysis and evaluation of employment levels in cities and the implementation of measures tailored to the labor market situation are necessary. In Ganja, there is a need for the creation of 4,000 new jobs annually, but only 1,000 jobs are created. Specific measures should be taken to address youth and female unemployment.

Despite the development programs, serious problems still persist in this sector. Therefore, measures must be taken to process agricultural products and utilize local natural resources.

In the process of the economic reforms, the improvement of the structure of the economy has so far shown weak positive results. To make efficient use of the Ganja's economic and socio-demographic potential, it is necessary to expand the activities of metallurgy, machine-building, and chemical industry enterprises, as well as create enterprises that process agricultural products.

Due to the weak energy supply from domestic production in the region, there are problems with the functioning of aluminum smelting plants. The Automobile Plant in Ganja city is engaged in the assembly of various types of vehicles. For the sustainable operation of the enterprise, it is necessary to have specialized sectors.

The creation of a center for the processing of household waste around the city of Ganja would be of great importance in protecting the environment.

It is advisable to build service sectors for the population in a complex manner, ensuring they meet modern requirements.

The scientific works published in accordance with the topic of the dissertation:

1. Baghirova, F.R. Structural changes in Azerbaijan's agriculture. "Development of Agricultural Science, Food Security, and International Cooperation in Environmental Protection." VIII International Scientific and Practical Conference. ADAU, – Ganja, – 2016. – Volume II, – pp. 298-302 (co-authored with Z.N. Eminov) (in Aze.).

2. Baghirova, F.R. The economic structure of Ganja city and problems of its improvement. // "Demographic development in the Republic of Azerbaijan: prospects of population settlement and regional issues" scientific conference. – Baku, – 2016, – pp. 420-429 (in Aze.).

3. Baghirova, F.R. Territorial organization and development problems of healthcare facilities in the Ganja-Gazakh economic region // – Baku: Human and Environment Relations. Proceedings of Azerbaijan Geographical Society. – Volume XX. – 2017. – pp. 489-493. (co-authored with L.M. Abasova) (in Aze.).

4. Baghirova, F.R. Integration of Azerbaijan into the world economy and social-economic development problems in the Ganja-Gazakh economic region. // Baku State University. Materials of the Republican Scientific-Practical Conference dedicated to the 94th anniversary of the birth of National Leader H. Aliyev on the topic "Global Economic Environment and Azerbaijan's Economic-

Geographical Position." – Baku: – 2017. – pp. 137-142. (co-authored with E.S. Badalov and Kh.Sh. Jafarova) (in Aze.).

5. Baghirova, F.R. Problems of improving the economic structure of cities and its significance in demographic development. "Modernization in the Context of the Updated Content of Natural Sciences Education" International Scientific-Practical Conference. Kazakhstan Republic Geography Institute. – Almaty: – 2017. – pp. 619–621. (co-authored with Z.N. Eminov, R.R. Amanov, and E.G. Huseynova) (in Rus.).

6. Baghirova, F.R. The impact of water bodies on the formation of settlement areas in Azerbaijan // Materials of the International Scientific-Practical Conference on "Water Resources, Hydrotechnical Structures, and the Environment". – Baku, – 2017. – pp. 277-281 (co-authored with Z.N. Eminov, G.M. Aghabalayev, and Kh.A. Badalova) (in Aze.).

7. Baghirova, F.R. The role of the agrarian-industrial complex in the formation of the Ganja-Dashkasan industrial hub. // "Geography and Natural Resources", Works of the Azerbaijan Geographical Society. – Baku:– 2018. – No. 2, – pp. 81-87 (in Aze.).

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10. Baghirova, F.R. Economic structure and problems of the economic-geographical development of industrial hubs in Azerbaijan. // Kyiv: Geography and Tourism, – Issue 57, – 2020. – pp. 42-49 (in Rus.).

The defense of the dissertation work will be held on the 04 April at 11:00 at the meeting of the Dissertation Council FD 2.51 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at the Baku State University.

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The dissertation is accessible at the library of the Baku State University.

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