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Study of industrial production in Azerbaijan based on anamorphosis maps

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Keywords

Industry
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Abstract

The industry is the leading area of material production and was formed during the division of social production. The availability of natural resources and market demand for the manufactured product is the main condition for its formation. Industrial development promotes the rational territorial organization of productive forces, regions' comprehensive development, and the appropriate use of natural resources. In recent years, a significant increase in the specific weight of science-intensive industries has become a defining feature of the development trend of world industry. The application of the achievements of scientific and technical progress in production areas leads to the specialization of not only finished products but also their constituent parts. For this reason, the approach to industrial production from an economic-geographic point of view is of particular importance. Spatial analysis of industry constitutes a logical paradox (contradiction) about regional sustainable development. In this regard, many specialists use the method of multidimensional approach (logical description) in industrial geography. The multidimensional approach is based on the analysis of the operational processing of the information entered into the database management system with the help of a computer. One of the methods of such an approach is related to the preparation of anamorphosis maps, in which we tried to reveal regional differences with the help of these maps in our research.

1. Introduction

The volume and development of industrial production depend on its specific characteristics, the geopolitical position of the country, the degree of provision of natural resources, the industrialization of production, the level of application of the achievements of scientific and technical progress to production, investment and so on (Shafizade, 2016). The guarantor of the sustainable development of industrial production is determined by the scientific necessity of all components. This is also measured by the geographical location of industrial production, its competitiveness, constant updating of the management mechanism, tolerance to external environmental influences, and so on.

The traditional fields of industry are determined by the rational material needs of economic subjects based on the pyramid of individual needs in sustainable industrial production (Maevsky et al. 2016). However, the research conducted in this direction shows that the sustainability of industrial production is studied mainly in the financial and economic aspects. This ensures the

stable use of income, free manoeuvring of the resources of the production enterprise, and uninterrupted production and sale of products (Rodionova and Fedotova, 1995).

The development of industry causes an increase in labour productivity, an expansion of the possibilities for using manufactured products in all areas of the economy, an intensification of the efficiency of social production, etc. This suggests that industry is the leading sector of production and the national economy. The role of the industry in the sustainable development of the country consists of the following:

- the volume of production in the industry is greater than in other areas of production;
- the largest share of the value of production fixed funds (active and passive) is concentrated in the industry;
- the industry contributes to the development of other sectors of the economy;
- serves to expand industrial economic cooperation;
- enables more rational use of industrial labour resources, etc.

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2. Method

The assessment of the sustainable development of industrial production is carried out based on the economic-statistical analysis method. However, the use of this analysis method is not enough to conduct a comprehensive approach. At this time, there is a need for new non-standard methods, and the development of industrial production requires new scientific-methodological approaches based on logic. One such approach is related to anamorphic maps.

An anamorphosis map means a distorted map. An anamorphosis map is a description of the territory of the state according to the variable of the given cartographic map scheme in scientific language (Strelova and Panevina, 2010). That is, anamorphosis is a map-like representation in which the size of an object (country, region, etc.) is proportional to the value of its numerical indicators (GDP, population, etc.) (Sokolov and Titkova, 2018). The creation of anamorphosis maps is very useful in many cases in terms of the modified structure of the interaction of several factors for visual analysis (Serdyutskaya et al. 2008). Anamorphosis maps are compiled based on statistical indicators. The advantage of these maps over cartograms is that the mapped indicators are relatively easy to evaluate because they cause continuous change.

3. Results

The industrial geography of Azerbaijan is mainly characterized by oil and gas extraction, mining, light and food industries based on local raw materials, and construction industries (Imrani and Zeynalova, 2014). If we analyze the location of industrial areas using the historical approach, we will see that the achievements in this area have led to the development of some regions at a high pace, while others have been left behind. From a comprehensive point of view, this division has become an integral part of sustainable economic-geographical development or regional policy. The level of economic development of the country is closely related to the principles of proper positioning and coordination of its regional policy and industries.

The economic development of Azerbaijan affects the increase in the number of industrial enterprises operating in the territory and their production capacity. If we analyze the years 1995-2021, we will see that the number of industrial enterprises increased by 1595 enterprises to 3689 enterprises (Figure 1). Among these enterprises, the mining and processing industries are mostly selected with their own development pace. Although this growth rate was recorded in all sectors, a higher growth number was recorded in the processing industry, with 933 enterprises. The increase in the mining industry was 263 enterprises, in water supply 258 enterprises, and electricity and gas production 171 enterprises. Although the overall growth rate of the processing industry is sharply different from other industries, it has been observed in the sub-sectors of this industry in a decreasing trend. Production of food products 90 enterprises, installation and repair of machinery and equipment 20 enterprises, and to a lesser

extent 8 enterprises of wood processing, 8 enterprises of machinery and equipment production suffered a decrease more. Although there was a sharp decrease in the production of food products in 1998 (329 enterprises), in the following years there was a trend observed with an increase and sometimes a decrease. The sharp decrease in the number of other enterprises coincides with 1998. For example, 218 enterprises in the installation and repair of machinery and equipment, 68 enterprises in the production of beverages (alcoholic and non-alcoholic), and 60 enterprises in the production of construction materials were terminated in just one year (Industry of Azerbaijan, 2003; Industry of Azerbaijan, 2022). The reason for this was the observation of deflation (a drop in production and income) in the country. Deflation hurt the development of all areas, slowed regional development, and reduced the volume of industrial output and the number of jobs, as well as the income of the population.

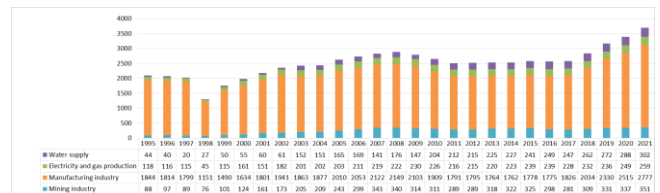


Figure 1. Number of industrial enterprises, unit

If we look at the percentage of industries, we will see that most of the total industrial enterprises, i.e. 75.3%, belong to the processing industry. Mining has a very low figure of 9.5%, water supply 8.2%, electricity and gas production 7.0% (Industry of Azerbaijan, 2022). The distribution of industrial enterprises operating in Azerbaijan by types of ownership has undergone significant changes in recent decades. In connection with the privatization policy in the country, in 1993 the Law "On Privatization of State Property" (Law of the Republic of Azerbaijan, 1993), in 1995, the State Program "Privatization of State Property in 1995-1998" (The Law of the Republic of Azerbaijan, 1995) was adopted and already in 1998, a new form of ownership was created in connection with the privatization of state property. In that year, the share of state ownership in the industry was 44.7%, and the share of non-state ownership was 55.3%. 28 enterprises privatized by foreign companies made up only 3.9% of the non-state sector. However, in 2021, the share of state ownership decreased to 15.3%, and the share of non-state ownership increased to 84.7%, of which 9.8% (307 enterprises) belonged to foreign companies.

While there has been a significant change in the composition of industrial enterprises in Azerbaijan in recent years, quality changes have also occurred. In the most general form, these changes were more evident in the ratio difference between the mining and processing industries. If we look at the production volume of industrial enterprises in 1995-2021, we will see that growth has been noticeable in all areas. The increase in the volume of total industrial products was 31.2 times. This growth trend is reflected by various indicators in the fields. An increase of 104.5 times in the mining industry, 15.1 times in the processing industry, 13.8 times in water

supply, and 7.8 times in the production of electricity and gas was recorded (Figure 2). Such growth occurred in all areas of production. However, during the studied years, the highest growth indicators were in the production of metal ores 10.7-387.5 million manats, installation and repair of machines and equipment 4.1-516.0 million manats, furniture production 344.3-33710.1 million manats, production of finished metal products 4.4-381.6 million manats, etc. fields (Industry of Azerbaijan, 2003; Industry of Azerbaijan, 2022). It can be concluded that not only the production of mining industrial products, which occupies a leading position in the country's economy but also other sectors and all their sub-sectors have seen a growing trend. In certain years, this increase has gone along with the decline, even if slight, due to the economic crisis observed in the world (a sharp increase in inflation in the countries of the world) and devolution in the country (depreciation of the national currency unit compared to the dollar).

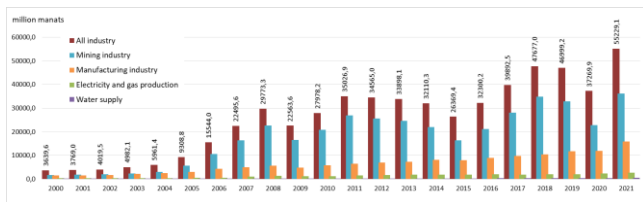


Figure 2. The volume of products produced by industrial enterprises, million manats

Industrial production acts not only as a leading force but also as a provider of the country's economy and economic sectors, regional development. Since the industry is valued as an economic power, social security, employment and infrastructure provision, regional advantages should be studied accordingly, because the development of industrial production in any region leads to the comprehensive rise and stability of that region. For example, Baku city accounts for 98.7% of oil production and 99.9% of gas production, which is considered the leading force of industrial production in the country, and the rest for Shirvan, Salyan, Neftchala and Siyazan regions. This factor has led to the development of Baku city at a higher pace than other regions and the emergence of regional inequality. In addition to oil and gas production, in the exploitation of other valuable mineral deposits in the country: gold Dashkasan 57.1%, Gadabey 42.9%, silver Dashkasan 86.1%, Gadabey 13.9%, copper Gadabey takes a leading place at 100%. Apart from these, the extraction of gravel, crushed stone and small river stone building materials have been expanded in the regions in connection with the development of the construction industry in recent years. While in 2011, the production of basic construction materials was in 7 regions, in 2021 this indicator was increased to 13 regions. The cities and regions where gravel, crushed stone and small river stone materials intended for construction are extracted include Imishli 49.1%, Gabala 15.5%, Guba 10.4%, Baku 8.6%, Absheron 7.0% and so on. In the production of sand for construction, Nakhchivan 32.9%, Imishli 22.6%, Gabala 21.5%, Baku 19.8%, etc.; limestone Baku 66.2%,

Absheron 22.9%, Gazakh 9.9%, gypsum Goranboy 93.5%, Baku 6.5% (Industry of Azerbaijan, 2022).

Gadabey, Dashkasan, Imishli, Gabala and other regions take the leading place in the above-mentioned minerals, except for oil and gas production. However, these regions lag in general development. This can be seen more clearly in the analysis of regional industrial production.

The disparity of resources (natural resources, skilled workforce, science-intensive production, social infrastructure, etc.) between regions and the unique developmental characteristics of society lead to the creation of potential but unidirectional areas. The economic, social and ecological aspects of these areas act as an integrated tool in regional planning. That is, the main goal of regional planning is to achieve at least a small amount of disparity between regions. National priorities are defined and the policy interface (interaction) is created within the regulatory regional strategy (Williamson, 1965). Industrial production is an important component of the development of resources in terms of socio-economic efficiency in this process. Because well-organized industrial areas are an integral part of the regional strategy, in addition to increasing the quality of production.

If we analyze the number of industrial enterprises in Azerbaijan, their production capacity and their share in the non-state sector, we will see that there is a constant growth trend. This growth is observed in all economic regions. In a small period, i.e., between 2005 and 2021, the highest growth is Nakhchivan 26.0 times, Karabakh 23.8 times, Mil-Mugan 22.3 times, Shaki-Zagatala 23.0 times, and the least Baku 5.9 times, Shirvan-Salyan 5.6 times, Central Aran 3.9 times (able 1.). However, in terms of regional development, these indicators are not fully justified. As in previous years, some economic regions lag behind the general development trend and continue to do so.

If we prepare the anamorphosis map of the industrial map of Azerbaijan on the main indicators of industrial production, we can see the extent of the changing trend. It turns out that a changing trend was observed as a result of the analysis of anamorphosis maps prepared by us, reflecting the years 2000 and 2021. Although this change is based on the principles of regional development, the Baku economic region is always at the forefront. In 2000, the Central Aran economic region, which developed relatively regionally, lagged behind its development pace in 2021 and was replaced by Absheron-Khizi and Nakhchivan, as well as Ganja-Dashkasan and Shirvan-Salyan economic regions (Figure 3). The advantage of anamorphic maps is that regional differences are more clearly revealed, which can be seen more clearly in Figure 3.

Anamorphosis maps are very suitable for visual analysis of regional phenomena, and modelling of the structure of their interaction. These maps help to see the real dangers. In the future, anamorphosis maps can be used to improve the development of regional strategic plans.

Table 1. The main indicators of industrial production

Economic regions	Years					
	2005			2021		
	Number of enterprises, units	Product production, million manats	The share of the non-state sector, in %	Number of enterprises, units	Product production, million manats	The share of the non-state sector, in %
Baku	1302	7725,1	72,9	1999	45309,7	85,9
Nakhchivan	96	41,2	66,6	111	1069,6	92,3
Absheron-Khizi	217	224,7	15,2	381	4125,8	69,9
Mountains Shirvan	39	6,0	42,7	57	88,9	81,0
Ganja-Dashkasan	190	137,7	24,9	197	860,8	60,8
Karabakh	60	8,2	46,9	85	194,8	66,3
Kazakh-Tovuz	96	31,8	17,4	98	416,3	76,5
Guba-Khachmaz	76	37,7	50,1	124	306,0	64,2
Lankaran-Astara	78	18,2	70,2	118	340,8	80,3
Central						
Aran	141	190,5	13,6	158	646,1	45,4
Mil-Mugan	66	24,9	64,4	85	554,5	92,6
Sheki-Zagatala	106	21,0	34,0	164	440,6	83,6
Eastern						
Zangezur	1	0,8	0,0	12	7,9	61,5
Shirvan-Salyan	85	153,6	47,2	100	867,3	65,5

4. Discussion

One of the problems arising in the territorial organization of the industry is the coordination of production. The correct organization of production coordination has a significant impact on the formation and development of industries. Because production relations play an important role in the formation of the economy. And the specialization of production is significantly important in the establishment of production relations between small industries whose complex development is related to each other. Analysis of these relationships is possible with the help of anamorphosis maps.

5. Conclusion

Based on the anamorphosis map of industrial production, it was partially possible to reveal several socio-economic problems in the economic regions of Azerbaijan. Despite the measures taken to improve the field and territorial structure of the industry in recent years, large enterprises based on the more efficient use of local resources should be created and their full capacity should be ensured. Only in this case, it is possible to significantly increase production in industrial enterprises and achieve innovations in the direction of efficient operation in the future. The analysis of all these on the map is possible based on the anamorphosis approach method.

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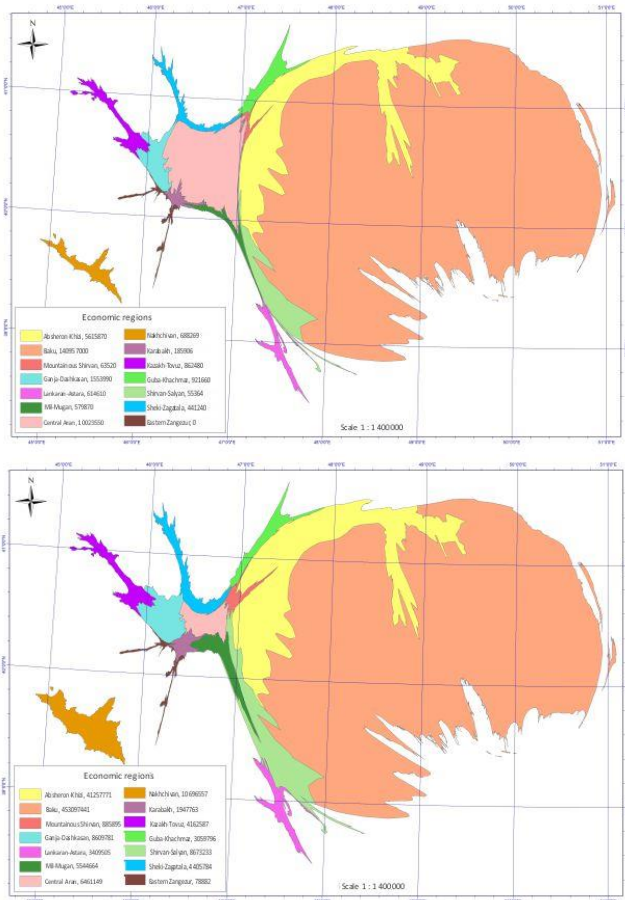


Figure 3. Map of industrial production anamorphoses

The Law of the Republic of Azerbaijan on the approval of the State Program of Privatization of State Property in the Republic of Azerbaijan in 1995-1998 (1995). Adopted on September 29, 1995. Baku: 22.

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