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Article

A Systemic Analysis of Territorial and Structural Imbalances in the Location of Industrial Enterprises in Bukhara Region

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Abstract: Based on official 2025 statistics, the thesis systemically analyzes territorial and structural imbalances in the location of industrial enterprises in Bukhara region. District-level industrial output per capita, average wages, and Hoover and Herfindahl–Hirschman indices are calculated. The concentration of production in Karaulbazar district, the dependence of industry on oil and gas and its low technological level are identified. The impact of these imbalances on income gaps is assessed, and measures for multipolar industrial location are proposed.

Keywords: industrial location, territorial imbalance, structural imbalance, systemic analysis, Hoover index, location quotient, technological structure, Bukhara region.

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1. Introduction

Two billion people 61% of the world's employed population earn their living in the The intraregional location of industrial enterprises shapes the territorial distribution of household incomes and employment. At a meeting held in Bukhara region on 29 November 2024, it was noted that the region's economic indicators fall short of its potential and that efforts to reduce poverty and unemployment were unsatisfactory [1]. Presidential Resolution No. PQ-287 set growth drivers for each district [2]. Presidential Decree No. PF-21 tasked regions with aligning their territorial strategies with the "Uzbekistan – 2030" Strategy [3].

The aim of the study is to carry out a systemic analysis of territorial and structural imbalances in the location of industrial enterprises in the region, of their interrelation and consequences, and to substantiate directions for overcoming them.

1.1 Literature Review

In recent years, attention to regional imbalances in the research literature has grown markedly. Iammarino, Rodríguez-Pose and Storper, using European evidence, showed that interregional disparities have widened over recent decades and that this process is linked to agglomeration effects [4]. Rodríguez-Pose argued that neglecting lagging regions leads to socio-political discontent and proposed place-sensitive policy [5]. Boschma demonstrated that regional diversification proceeds most successfully through related industries that are technologically close to existing capabilities [6]. Badeeb and co-authors summarized the risks of the "resource curse", including the slowdown of diversification in economies reliant on raw materials [7].

For Uzbekistan, Ziyadullaev and Aimbetov, drawing on data for 2018–2022, identified factors constraining the development of the country's depressed regions [8]. Ibragimov noted that industrial activity and exports in Bukhara region are concentrated in a few economic centers [9]. However, the interrelation of territorial and structural imbalances within the region and their impact on incomes have not been assessed systematically.

2. Materials and Methods

Following a systemic approach, imbalances were analyzed at four levels: territorial, sectoral, technological and socio-economic. The national benchmarks are from the National Statistics Committee [10]. District-level data are from the Bukhara Regional Statistics Department [11]. Territorial imbalance was assessed using the Hoover index [12]:

$$H = \tfrac{1}{2} \cdot \Sigma \, |s_i - p_i| \quad (1)$$

where si and pi are the shares (in percent) of the i-th district (city) in industrial output and in population, respectively; H = 0 indicates that each district's output share matches its population share, and 100 is the theoretical upper limit. The degree of concentration was measured by the Herfindahl–Hirschman index (HHI = Σ si^2) [13]. Structural differences were measured by the location quotient [14]:

$$LQ_j = v_j / r_j \quad (2)$$

where vj and rj are the shares of sector j in gross value added of the region and of the country, respectively. The relationship between industrial development and incomes was assessed using Spearman's rank correlation coefficient [15].

3. Results

The region contributes 4.7 percent of the country's gross domestic product; its gross regional product per capita equals 85 percent of the national level, and industrial output per capita equals 88 percent. The location quotient is 1.88 for agriculture and 0.81 for industry.

Territorial imbalance within the region is sharp. Karaulbazar district, home to 1.0 percent of the population, generates 42.9 percent of industrial output, whereas the nine rural districts, home to 77.2 percent of the population, generate only 28.1 percent (Table 1). For the output allocated across districts, the HHI is 2,657 (against 769 under an equal distribution) and the Hoover index is 49.1; even excluding Karaulbazar district, the Hoover index stands at 18.3. In 2025, industry grew by 11.4 percent in Karaulbazar district and by 7.1 percent in the region as a whole.

Table 1. Distribution of Industry and Average Wages by District, 2025

District / city	Share of industrial output, %	Share of population, %	Industrial output per capita, million UZS	Monthly wage, thousand UZS
Karaulbazar district	42.9	1.0	1,124.3	7,421.6
Kagan district	4.7	4.2	29.1	4,711.6
Kagan city	2.9	3.1	24.0	7,225.4
Bukhara city	9.4	14.5	16.7	6,280.9
Romitan district	4.5	7.4	15.6	4,465.5
Alat district	2.1	5.1	10.5	3,740.7
Peshku district	2.5	6.4	9.9	3,820.7
Gijduvan district	6.0	15.8	9.7	3,702.1
Jondor district	3.2	9.1	9.0	3,414.6
Vobkent district	2.6	7.3	9.0	3,487.0
Bukhara district	2.6	8.8	7.7	4,197.0
Karakul district	2.4	8.4	7.4	3,857.2
Shafirkan district	2.3	9.1	6.5	3,523.0
Bukhara region	**100.0**	**100.0**	**25.6**	**5,093.1**

Source: Author's compilation based on the Bukhara Regional Statistics Department [11].

In structural terms, coke and refined petroleum products account for 40.8 percent of industrial output and textile, clothing and leather products for 18.1 percent; of the 3,223

enterprises, 22.3 percent produce food and 15.9 percent produce construction materials. The share of medium-high- and high-technology industries in manufacturing fell from 2.5 percent in 2024 to 2.1 percent, compared with 20.6 percent nationally.

The imbalances are reflected in incomes. In Karaulbazar district and Kagan city, the average wage is 42–46 percent above the regional level, while in Jondor, Vobkent and Shafirkan districts it is 31–33 percent below it. The Spearman coefficient between industrial output per capita and wages is 0.74, and the region's average wage amounts to 79.9 percent of the national level.

4. Discussion

The concentration indices show that industrial output is unevenly distributed across districts. Karaulbazar's higher industrial growth rate than the region as a whole is consistent with a widening concentration of output in 2025. The prominence of petroleum refining and the small share of medium-high- and high-technology manufacturing also point to limited diversification. Related diversification could build on existing industrial capabilities while extending processing activity to other districts [6].

The positive rank correlation indicates that districts and cities with higher industrial output per capita tend to report higher average wages. The cross-sectional comparison establishes an association. Other local factors may also contribute to the observed wage differences.

5. Conclusion

The analysis shows that territorial concentration (a Hoover index of 49.1), a raw-material-dependent sectoral structure and a low technological level coincide with wage disparities between districts. On this basis, we propose the following:

1. Form secondary industrial poles: an agro-industrial pole (Gijduvan–Vobkent–Shafirkan), a logistics and light-industry pole (Bukhara–Kagan), and a chemical and textile pole (Karakul–Alat–Jondor).

2. Locate processing chains that are technologically related to the oil and gas sector (polymer and chemical products) in other districts, and deep fruit-and-vegetable processing capacities in rural districts close to the raw-material base.

3. Set target indicators for the district-level Hoover index, HHI and wage gap in the regional strategy, and monitor them annually.

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