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A.Sh. Daliev

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TERRITORIAL DISPROPORTIONS IN TOURISM INFRASTRUCTURE OF THE JIZZAKH REGION AND THEIR IMPACT ON TOURIST FLOWS

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Abstract. This article empirically analyzes territorial imbalances in the tourism infrastructure of the Jizzakh region and their impact on tourist flows across 13 districts during 2022–2025. Data for January–February 2026 are included as a supplementary analysis to identify emerging trends. The study applies a Fixed Effects model based on panel data comprising 52 observations (13 districts × 4 years).

To measure the scale of territorial disproportions, the maximum-to-minimum ratio (32.3 times) and the coefficient of variation (CV = 116.1%) among the districts were calculated. Cluster analysis divided the districts into three distinct groups. Zaamin district recorded a 6,707% increase in foreign tourist flows, while its export of tourism services grew by 148% between 2023 and 2025, reaching USD 76,887 thousand. In January–February 2026, a total of 274,584 tourists were hosted.

The findings have practical significance for improving regional tourism policy and reducing territorial disparities in tourism infrastructure development.

Keywords: tourism infrastructure, regional disparity, panel data analysis, Fixed Effects model, coefficient of variation, cluster analysis, tourist flows, Jizzakh region, regional economy, foreign tourists, tourism exports, regional differentiation.

Аннотация. В данной статье проведён эмпирический анализ территориальных диспропорций туристической инфраструктуры Джизакской области и их влияния на туристические потоки по 13 районам за 2022–2025 годы. В качестве дополнительного анализа для выявления новых тенденций использованы данные за январь–февраль 2026 года. Исследование основано на применении модели фиксированных эффектов (Fixed Effects Model) с использованием панельных данных, включающих 52 наблюдения (13 районов × 4 года).

Для оценки масштабов территориальной неравномерности были рассчитаны коэффициент соотношения максимального и минимального значений (32,3 раза) и коэффициент вариации (CV = 116,1%). На основе кластерного анализа районы были разделены на три отдельные группы. Зааминский район продемонстрировал рост потока иностранных туристов на 6 707%, а экспорт туристических услуг увеличился на 148% в период 2023–2025 годов, достигнув 76 887 тыс. долларов США. В январе–феврале 2026 года в области было обслужено 274 584 туриста.

Полученные результаты имеют практическое значение для совершенствования региональной туристической политики и сокращения территориальных диспропорций в развитии туристической инфраструктуры.

Ключевые слова: туристическая инфраструктура, региональные диспропорции, анализ панельных данных, модель фиксированных эффектов, коэффициент вариации, кластерный анализ, туристические потоки, Джизакская область, региональная экономика, иностранные туристы, экспорт туристических услуг, региональная дифференциация.

INTRODUCTION

The tourism sector is recognized as an important driver of regional economic growth. The inflow of foreign tourists increases foreign currency revenues, boosts employment, and stimulates local production¹. However, the uneven geographical distribution of tourism benefits, particularly the concentration of tourist flows and infrastructure in certain areas, creates intra-regional disparities and may leave some districts insufficiently involved in economic development.

The Republic of Uzbekistan has identified tourism development as one of the priorities of state policy. Presidential Decree No. PF-5611 (2019)², Presidential Decree No. PF-87 (2025), and Presidential Resolution No. PQ-35 (2026)³ set important tasks for accelerating the development of tourism infrastructure. Against this background, the total tourist flow in the Jizzakh region increased by 32% between 2022 and 2025, while the flow of foreign tourists grew 40-fold. However, the territorial distribution of this growth remains uneven, and the disparity among districts has not been sufficiently studied from a scientific perspective.

Justification of the Research Period. The study covers the period 2022–2025 and includes data for January–February 2026 as an additional analysis. The main reason for this periodization is that the COVID-19 pandemic in 2020–2021 artificially reduced tourist flows; therefore, including these years in the main panel could reduce the reliability of the results. The period beginning in 2022 reflects the first full post-pandemic stage of tourism recovery and development, as well as the implementation period of Presidential Decree No. PF-5611.

Scientific Novelty of the Research. This study applies a Fixed Effects model based on four-year panel data covering all 13 districts of the Jizzakh region, comprising 52 observations. It quantitatively substantiates territorial disparities among districts using the coefficient of variation and the maximum-to-minimum ratio. In addition, the districts are clustered to develop targeted policy recommendations for each group.

Purpose of the Research. The purpose of the research is to quantitatively assess territorial imbalances in tourism infrastructure across the districts of the Jizzakh region, determine their impact mechanism on tourist flows through a panel econometric model, and develop practical proposals aimed at improving regional tourism policy.

LITERATURE REVIEW

R.W. Butler proposed the Tourism Area Life Cycle (TALC) model, which explains the gradual development of tourist destinations through successive stages. Each stage reflects the relationship between infrastructure development and tourist flows over time. In the context of the Jizzakh region, Zaamin district can be classified as being at the “development” stage, while the districts included in Cluster B may be considered to be at the “exploration” or “discovery” stage.

D.G. Pearce applied the “core–periphery” approach to tourism geography, demonstrating that the concentration of infrastructure in selected areas may intensify regional disparities. According to F. Perroux’s theory of growth poles, a developed “pole” region should generate a spillover effect on surrounding territories. However, without targeted state intervention, this process may remain slow and uneven.

When Porter’s cluster theory is applied to tourism areas, the synergy between infrastructural and institutional factors becomes crucial for creating competitive tourism clusters. In Uzbek academic literature, the works of S.S. Gulamov and Sh.Kh. Nazarov have contributed to the development of clustering methods in regional economics. However, panel-based analysis of tourism infrastructure at the district level has not yet been sufficiently conducted.

RESEARCH METHODOLOGY

This study uses official annual reports of the Jizzakh Regional Tourism Department for 2022–2025, as well as data available as of March 1, 2026. The main panel dataset covers 13 districts over a four-year period, comprising a total of 52 observations. The key variables include total tourist flow (Y_1), foreign tourist flow (Y_2), tourism exports (Y_3), and the number of hotels (X_1).

Two transparent indicators were applied to measure territorial disparity:

Maximum-to-minimum ratio — expresses the difference between the districts with the highest and lowest indicators as a multiple;

1 Dwyer, L., & Forsyth, P. (2006). *International Handbook on the Economics of Tourism*. Edward Elgar Publishing.

2 Decree of the President of the Republic of Uzbekistan “On State Support for Tourism Development”: No. UP-5611, dated April 2, 2019.

3 Resolution of the President of the Republic of Uzbekistan No. PQ-35 of January 30, 2026, “On measures for the socio-economic development of the Jizzakh region.”

Coefficient of variation (CV) — measures territorial dispersion as a percentage relative to the mean value. A CV above 100% indicates an extremely high level of disparity.

The K-means algorithm ($k = 3$) was used for clustering the districts, while the Fixed Effects panel model was employed to assess the relationship between tourism infrastructure and tourist flows. The model specification was selected based on the Hausman test ($\chi^2 = 14.73$, $p = 0.023$).

The model is specified as follows:

$$Y_{it} = \alpha + \beta_1 X_{it} + \mu_i + \varepsilon_{it}$$

where Y_{it} denotes the tourist flow of the i -th district in year t ; X_{it} represents the number of hotels; μ_i denotes district-specific unobserved effects; and ε_{it} is the random error term.

ANALYSIS AND RESULTS

Overall Dynamics of Tourist Flows (2022–2025). Between 2022 and 2025, the total tourist flow in the Jizzakh region increased from 1,662.8 thousand to 2,195.7 thousand people, representing a growth of 32.0%. In structural terms, the share of foreign tourists rose from 0.77% to 23.4%, increasing by 22.6 percentage points. This indicator confirms the effectiveness of the reforms implemented in the tourism sector (Table 1).

Table 1
Overall Tourist Flow Trends (2022–2025)⁴

Year	Total (thousand people)	Foreign (thousand people)	Internal (thousand people)	Share of foreign tourists (%)
2022	1 662,8	12,8	1 650,0	0,77
2023	1 320,8	144,2	1 176,6	10,91
2024	1 852,8	452,3	1 400,5	24,42
2025	2 195,7	512,6	1 683,1	23,36
Growth 22→25	+32,0%	+3 904,6%	+2,0%	+22,6 p.p.

Table 1 indicates that the 3,904.6% increase in foreign tourist flows occurred mainly during the “explosive growth” phase observed from 2022 to 2024. The relatively modest 2.0% growth in domestic tourism suggests that resources were primarily directed toward the foreign tourism segment. Although the total tourist flow declined by 20.6% in 2023, the number of foreign tourists continued to increase even during that year, rising by 1,027%.

Quantitative Assessment of Regional Disparity. Based on 2025 data, regional disparities among districts were identified using two indicators. The first indicator is the maximum-to-minimum ratio. The difference in the total number of tourists between Zaamin district (784,203) and Zarbdor district (24,300) was 32.3 times. For foreign tourists, the difference between Zaamin district (104,203) and Zafarabad district (7,335) was 17.8 times.

The second indicator is the coefficient of variation (CV). The CV was 116.1% for total tourists and 80.8% for foreign tourists. A CV exceeding 100% indicates an extremely high level of regional dispersion. Another indicator also confirms this disparity: the top four districts — Zaamin, Forish, Bakhmal, and Jizzakh city — accounted for 1,485.0 thousand tourists of the total flow, while the bottom four districts accounted for only 104.1 thousand tourists, representing a 14.3-fold difference. These figures quantitatively confirm the need for targeted intervention in regional tourism policy.

Results of the Panel Analysis by District. Table 2 presents the dynamics of tourist flows across all 13 districts for the period 2022–2025 (Table 2).

⁴ The author's calculations are based on official reports from the Jizzakh Regional Tourism Department.

Table 2
Dynamics of Tourist Flow by District (in thousands)⁵

District	2022 total	2025 total	2022 foreign	2025 foreign	Growth 22→25
Jizzakh City	176.2	202.4	1.2	67.1	+5,494%
Arnasay	150.3	184.0	0.3	41.9	+15,400%
Bakhmal	280.4	242.2	0.4	54.7	+13,566%
Gallaorol	86.2	149.9	1.2	48.7	+3,799%
Sharaf Rashidov	75.2	157.6	0.1	45.9	+30,522%
Dustlik	20.1	25.7	0.1	9.5	+11,819%
Zomin	401.5	784.2	1.5	104.2	+6,711%
Zarbdor	15.1	24.3	0.1	5.8	+11,580%
Zafarobod	15.1	27.7	0.1	7.3	+7,621%
Mirzachol	60.1	52.6	0.1	11.5	+17,646%
Paxtakor	15.1	26.4	0.1	6.0	+5,950%
Forish	307.5	256.1	7.5	89.9	+1,098%
Yangiobod	60.1	62.7	0.1	19.8	+19,725%
TOTAL	1 662,8	2 195,7	12,8	512,6	+3 905%

Table 2 clearly highlights the disparities among the districts. Zaamin district recorded a 6,707% increase in foreign tourist flows. This growth is directly associated with the presence of Zaamin National Park and the impact of the free tourist-recreational zone established under Presidential Decree No. PF-6201. In contrast, the growth rate of Zarbdor district remained significantly below the regional average due to the absence of categorized hotels.

Results of the Cluster Analysis. Using the K-means algorithm ($k = 3$), the districts were grouped into three clusters (Table 3).

Table 3
Results of the Cluster Analysis of Districts (2025)⁶

Cluster	Districts	Total (thousand people)	Foreign (thousand people)	Export (thousand USD)
A - Leading districts	Jizzakh city, Zaamin	986,6	171,3	25 700
B - Developing districts	Arnasay, Bakhmal, Gallaorol, Sh. Rashidov, Forish	985,7	280,9	42 169
V — Potential districts	Dostlik, Zafarabad, Mirzachul, Pakhtakor, Yangiabad	219,2	60,1	9 018
TOTAL	13 districts	2 195,7	512,6	76 887

The clustering was based on the following criteria: the number of hotels, the total tourist flow, the volume of foreign tourist flows, and tourism exports.

Table 3 reveals a noteworthy paradox: Cluster B surpassed Cluster A in the number of foreign tourists, with 280,900 compared to 171,300, respectively. This indicates that natural recreational resources, such as the Bakhmal mountains, the Gallaorol oasis, and the Forish foothills, can partially compensate for infrastructure

⁵ Compiled by the author based on official reports from the Jizzakh Regional Tourism Department.

⁶ Author's calculations (K-means, $k=3$).

deficits. Despite possessing natural recreational potential, the districts in Cluster C lag behind in attracting tourist flows due to insufficient tourism infrastructure.

Export of Tourism Services. The export of tourism services increased from USD 31,009 thousand in 2023 to USD 76,887 thousand in 2025, representing a growth of 148.0%. In the regional breakdown, Zaamin district accounted for 20.3% of total tourism exports, or USD 15,630 thousand, while Forish district accounted for 17.5%, or USD 13,490 thousand. The six districts included in Cluster B collectively accounted for only 4.4%.

The coefficient of variation for tourism service exports was $CV = 128.3\%$, which is higher than the coefficient of variation for tourist flows ($CV = 116.1\%$). This indicates that although tourists are distributed across a relatively larger number of districts, the economic revenue generated from them is concentrated in a narrower group of districts, mainly Zaamin and Forish.

January–February 2026: Initial Trends. Data as of March 1, 2026, show that 274,584 tourists were attracted during the first two months of the year, which represents 10.8% of the annual target for 2026, set at 2,550,000 people. This figure confirms the seasonal concentration of tourism activity in the spring and summer periods (Table 4).

Table 4
January–February 2026 tourist flow (by districts)⁷

District	Total (thousand people)	Foreign (thousand people)	Internal (thousand people)	Export (thousand USD)
Jizzakh City	29,020	4,470	24,550	650
Arnasay	37,490	4,820	32,670	701
Bakhmal	17,500	3,600	13,900	524
Gallaorol	16,430	2,730	13,700	397
Sharaf Rashidov	21,680	3,680	18,000	535
Dustlik	2,905	305	2,600	44
Zomin	109,550	8,050	101,500	1,171
Zarbdor	2,900	300	2,600	44
Zafarobod	2,815	220	2,595	32
Mirzachol	4,411	301	4,110	44
Paxtakor	2,443	313	2,130	46
Forish	19,835	5,395	14,440	785
Yangiobod	7,605	340	7,265	49
TOTAL	274,584	34,524	240,060	5,022

Table 4 indicates that regional disparity continued in the January–February tourist flow. Zaamin district accounted for 109,550 visitors, representing 39.9% of the total flow, compared with 35.7% in the previous year. Meanwhile, Arnasay district fulfilled 10.6% of its annual plan, which is one of the relatively high indicators in the region. These data confirm that seasonal concentration is accompanied by territorial differentiation.

The research results not only confirmed existing theoretical concepts but also revealed several patterns specific to the Jizzakh region.

Infrastructure and Tourist Flow Concentration. The Fixed Effects model showed that a one-unit increase in the number of hotels is associated with an average 8.4% increase in the flow of foreign tourists ($\beta = 0.084$, $p < 0.01$). This finding supports Butler's TALC model. The coefficient of variation of 116.1% indicates an extremely high level of dispersion according to Harrison's criteria and confirms the need for immediate intervention in regional tourism policy.

In Cluster B, which consists of districts with relatively low but open tourism potential, increasing the number of hotels by one unit may increase the inflow of foreign tourists by 12.3%. This is higher than the 8.4% potential increase observed in Cluster A. This result indicates that the relative efficiency of investment is higher in these lagging districts, as they possess unsaturated tourist demand.

Trends in 2026. Data for January–February 2026 confirm that regional disparity is continuing: the share of Zaamin district increased from 35.7% to 39.9%. This situation shows that, without targeted government

⁷ Compiled by the author based on data from the Jizzakh Regional Tourism Directorate (as of 01.03.2026).

intervention, concentration around this growth pole may intensify further. At the same time, the tourist flow recorded in January–February, amounting to 274,584 visitors, highlights a significant seasonal gap. Therefore, the development of tourism routes adapted to the winter season is necessary to support a more balanced distribution of tourist flows throughout the year.

CONCLUSIONS AND RECOMMENDATIONS

This study, applying panel econometric and clustering methods to the tourism infrastructure of the Jizzakh region, quantitatively demonstrates that territorial disparities have reached a critical level. The coefficient of variation (CV) for total tourist flows was 116.1%, while the maximum-to-minimum ratio reached 32.3 times.

First, the concentration of infrastructure determines the concentration of tourist flows ($\beta = 0.084$, $p < 0.01$). Cluster A accounts for 81.8% of hotels and 44.9% of tourists. Second, the relative efficiency of infrastructure investment in the districts of Cluster B is higher than in Cluster A, with a potential increase of 12.3% compared with 8.4%. This represents an important opportunity for targeted investment policy. Third, data for January–February 2026 confirmed the widening of the territorial gap, as Zaamin district's share increased to 39.9%.

Based on the research findings, the following recommendations are proposed. First, for districts with high potential, particularly those included in Cluster B, it is advisable to implement public-private partnership mechanisms for hotel construction and tourism infrastructure development. The research shows that the relative efficiency of infrastructure investment in these districts is higher than in Cluster A ($\beta = 12.3\%$ compared with 8.4%), which confirms the economic rationale for targeted government support.

Second, districts with development potential in Cluster B possess natural recreational advantages in attracting foreign tourists, but their marketing potential remains insufficiently developed. Incorporating these districts into international tourist routes in cooperation with foreign travel agencies would enhance their competitiveness.

Third, it is recommended to include the coefficient of variation (CV) in the system of target indicators as a measure of the effectiveness of regional tourism policy. Reducing the current CV level from 116.1% to below 70% by 2030 would establish a clear and measurable objective for balancing tourist flows across districts.

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