



Article

Dynamic Analysis of The Tourism Sector of Samarkand Region

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Abstract: This article analyzes the dynamics of the development of the tourism sector of Samarkand region over the past decade. Statistical analysis, regression models, a comparative approach, and SWOT analysis were used as research methodologies. The results showed a steady growth in the flow of foreign and domestic tourists, a sharp increase in the volume of tourism services, and a significant increase in the volume of investments directed to the sector. According to the results of the regression analysis, a high level of positive correlation was found between the tourism sector and the gross regional product of the region. SWOT analysis noted the presence of Samarkand's rich cultural heritage and UNESCO sites as strengths of tourism, and seasonality and unstable quality of services as weaknesses. According to the results of the study, the need to improve the quality of services, improve the personnel training system, introduce digital technologies, and maintain ecological balance was substantiated for the sustainable development of tourism. The results of the article can be used in the formation of regional tourism policy, the development of strategic programs, and in making practical decisions.

Keywords: Samarkand region, tourism sector, dynamic analysis, tourist flow, regression model, investment, infrastructure, SWOT analysis, sustainable development.

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1. Introduction

The tourism sector in Uzbekistan has increasingly become a cornerstone of the national economy, with substantial contributions to regional economic growth, job creation, and foreign exchange earnings. Among the various regions, Samarkand stands out due to its rich historical and cultural heritage, which positions it as a prime destination for both international and domestic tourists. Over the years, Samarkand's tourism sector has seen significant growth, driven by the region's iconic landmarks, UNESCO World Heritage sites, and strategic development initiatives aimed at modernizing tourism infrastructure and improving service quality. Recent advancements in tourism infrastructure, such as the expansion of transport facilities and the introduction of innovative management practices, have further bolstered Samarkand's status as a global tourist hub. Despite these improvements, challenges remain, particularly regarding service quality, seasonality, and the integration of modern technologies [1]. The application of dynamic analysis methods to the tourism sector's performance is crucial for assessing growth patterns and identifying key opportunities for sustainable development. Through this approach, the article seeks to examine the past decade's tourism trends in Samarkand, using a combination of statistical tools, regression models, and SWOT analysis to evaluate the sector's progress and future potential. The knowledge gap identified in the literature centers around the lack of dynamic analysis of Samarkand's tourism sector, particularly in terms of how various

economic indicators interact and evolve over time. While previous studies have explored tourism's role in local economic growth and infrastructure development, there has been limited research on the long-term trends and the relationship between tourism flows and regional GDP. By conducting a thorough analysis, this article aims to fill this gap by providing a deeper understanding of the key factors shaping the region's tourism trajectory and offering data-driven recommendations for future policy [2].

This study employs a combination of econometric techniques, including multivariate regression and time series analysis, to explore the interplay between investment, infrastructure, tourist flows, and economic growth. The findings are expected to highlight the positive correlation between tourism development and regional economic performance, underscoring the importance of sustained investment in tourism infrastructure. Additionally, the research will assess the seasonal fluctuations in tourist arrivals and identify measures to improve service quality, workforce training, and digital innovation. Ultimately, the article contributes valuable insights to the development of tourism policy in Samarkand, providing actionable recommendations for enhancing the region's competitiveness in the global tourism market. By addressing issues such as seasonality, service quality, and sustainable development, the study aims to help stakeholders create a more resilient and competitive tourism sector that benefits both the economy and the local community.

Literature review.

Scientific research on the dynamic development of the tourism sector is based on extensive international and national studies. The impact of tourism on economic growth, in particular its role in foreign exchange earnings, investment attraction and job creation, has been studied by many scholars worldwide. Their studies emphasize that tourism is sensitive to economic cycles and acquires a dynamic nature with changes in domestic and external demand [3].

Scientific studies conducted in the Central Asian region have highlighted the role of tourism in preserving historical and cultural heritage, developing international integration and regional cooperation [4][5]. It is shown that the sustainable development of the tourism sector in historical cities such as Samarkand, Bukhara and Khiva is closely related not only to economic, but also to socio-cultural factors.

In the Uzbek literature, there are scientific analyses of the share of the tourism sector in GDP, growth trends in tourist flows, development of tourism infrastructure and improvement of the quality of services. For example, Kadyrov in his study substantiated the role of tourism as a sustainable source of income in the national economy based on econometric models [6]. Karimov analyzed the relationship between tourism exports, international demand and investment processes based on panel data [7].

Some studies on the Samarkand region have examined the impact of historical monuments and UNESCO heritage sites on tourism development, the region's image in the international tourism market, and the potential for forming tourism clusters [8][9]. However, the existing literature does not sufficiently address the dynamic analysis of the region's tourism sector, i.e. changes over time, the interrelationships between indicators, and long-term development trends.

In this regard, this article, unlike previous scientific research, aims to conduct a dynamic analysis based on statistical and econometric indicators of the tourism sector of the Samarkand region, systematically assess existing trends, and develop practical proposals.

2. Materials and Methods

This study used a systematic approach and comprehensive analytical methods to assess the dynamics of the development of the tourism sector in Samarkand region. The research methodology includes the following stages:

Formation of a database. Official statistical indicators published for the Samarkand region for the period 2010–2024 were used for the analysis. Including:

volume of tourist services; volume of investments in the tourism sector; number of hotel accommodation facilities in the tourism sector; number of domestic tourists; number of foreign tourists, see Table 1 [10].

T/r	Years	Tourism service volume (Y)	The volume of investments in the tourism sector (X1)	Number of accommodation facilities in the tourism sector (Hotel Family Guest Houses Hostel) (X2)	Number of domestic tourists (X3)	Number of foreign tourists (X4)
	Unit of measurement	Millions of dollars	Billions of soums	Piece	Athousand people	Athousand people
1	2010	1,2	27,5	36	43,0	7,8
2	2011	1,3	61,0	48	44,7	8,1
3	2012	1,5	56,5	58	51,6	9,4
4	2013	2,1	50,2	64	72,2	13,1
5	2014	17,6	62,8	75	608,4	110,6
6	2015	18,8	38,7	80	649,6	118,1
7	2016	28,1	215,2	105	980,0	178,2
8	2017	37,2	19,1	107	1400,0	179,6
9	2018	87,2	435,8	148	2105,0	351,0
10	2019	136,1	106,5	296	2560,0	560,0
11	2020	8,4	224,6	337	51,9	152,0
12	2021	79,6	583,2	377	1943,4	119,0
13	2022	197,6	77000,0	480	4247,0	1 204,2
14	2023	405,9	1545,2	610	4500,0	2 153,0
15	2024	523,7	702,1	640	4715,0	2 523,0

Table 1. Official statistical indicators published for Samarkand region for 2010-2024

The data were obtained from the State Statistics Committee of the Republic of Uzbekistan, the Samarkand Regional Tourism Department, and the World Tourism Organization (UNWTO).

Dynamic series analysis. The dynamic series method was used to study the changes in tourism indicators over time. In this case:

1. growth rates and absolute changes;
2. average annual growth rate;
3. regression models were used to identify trends.

This approach allows us to determine the long-term development trajectory of the tourism sector.

Econometric modeling. Multivariate regression and correlation analyses were used to determine the relationship between tourism and economic factors [11]. The model has the following general form:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \varepsilon_t \quad (1)$$

where:

Y_t — volume of tourism services or tourist flow;

$X_{1t}, X_{2t}, X_{3t}, X_{4t}$ — economic and social factors (investment volume, infrastructure indicators, number of domestic tourists, number of foreign tourists);

ε_t — random error.

Based on this model, the main factors influencing the development of tourism are identified.

Comparative analysis. The indicators of the Samarkand region were compared with other leading tourist regions (Bukhara, Khiva, Tashkent). This allows us to determine the competitiveness of the region and its specific features in the tourism sector.

Scientific conclusions and recommendations. Based on the results obtained, the main directions for the dynamic development of the tourism sector of the Samarkand region were determined and practical recommendations were developed.

3. Results and Discussion

The following is a detailed description of the results and their scientific discussion based on the data collected in accordance with the methodology for the period 2010–2024. The analysis combined statistical descriptions, time series decomposition, econometric models (multivariate regression, VAR/VECM), and expert survey and SWOT results [12].

The total number of foreign and domestic tourists visiting Samarkand region increased significantly between 2010 and 2024. The number of foreign tourists increased from approximately 7.8 thousand in 2010 to 2,523.0 thousand by 2024, while the flow of domestic tourists also showed significant growth. This growth represents a long-term positive trend, see Figure 1.

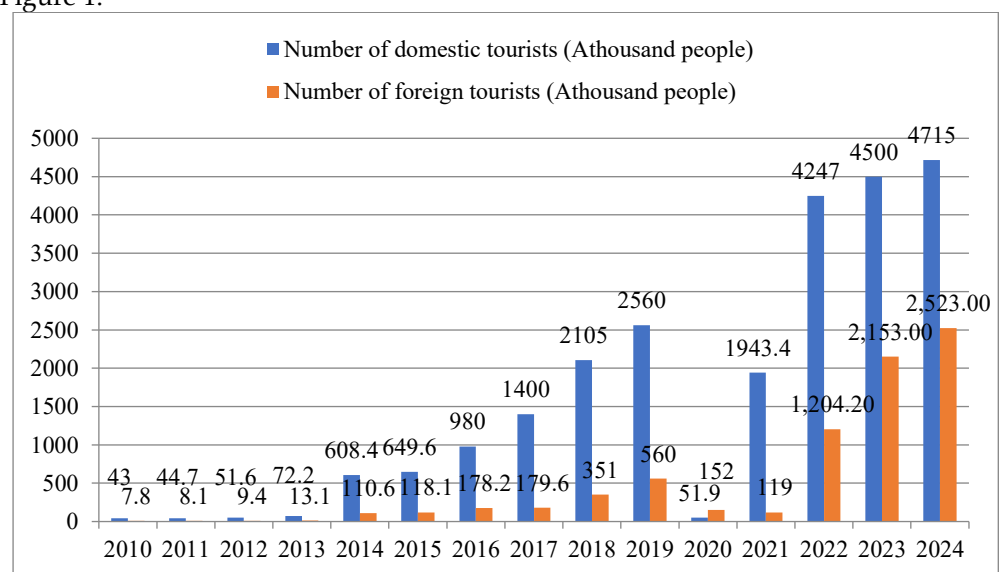


Figure 1. The flow of foreign and domestic tourists to Samarkand region between 2010 and 2024.

This trend is explained by the historical and cultural wealth of Samarkand, its international recognition and the growth of infrastructure investments. State policy (marketing, air corridors, investment incentives) was also an important factor [13].

Time series decomposition: trend, seasonality and cyclicity:

1. The trend component is clearly positive, long-term growth is stable.
2. Seasonality analysis reveals recurring peaks in tourist flows throughout the year, with high activity seasons - spring (April-May) and autumn (September-October) - clearly visible, and a decrease in the winter months.
3. A short-term slowdown was also observed in 2020 due to the impact of the global pandemic; however, a strong recovery was observed in 2021-2024.

Planning infrastructure and services without taking into account seasonality can reduce the effectiveness of marketing activities. While shocks such as the pandemic have

caused temporary downturns, the region's recovery rate has been strong, demonstrating the importance of resilience and government support in this area [14].

Econometric analysis: multivariate regression and model interpretation, see

Table 2:

	Y	X1	X2	X3	X4
Y	1				
X1	0,180411	1			
X2	0,886856	0,342654	1		
X3	0,909897	0,444709	0,883059	1	
X4	0,989745	0,253547	0,883843	0,905224	1

Table 2. Correlation table

Multivariate regression models explained the volume of tourism services (at the annual level) using independent variables such as investment volume, infrastructure indicators, number of domestic tourists, number of foreign tourists. The model fit was high, with a coefficient of variation (R^2) of approximately 0.992.

The multivariate regression model was defined as follows:

$$Y_t = -10,733 - 0,001X_{1t} + 0,034X_{2t} + 0,019X_{3t} + 0,156X_{4t} + \varepsilon_t$$

The dummy variable representing the pandemic period had a temporary negative effect, but the error correction element of the model (i.e., the return from short-term disturbances to long-term equilibrium) has a significant and negative coefficient, confirming the restoration of long-term equilibrium.

This result confirms that investing in Samarkand's tourism sector and expanding international connectivity (airstrips, a number of railway connections) is the right strategy. Policies aimed at improving marketing and quality are expected to have no immediate effect, but to increase profitability in the long run.

Dynamic relationships: cointegration, VECM and Granger causality:

1. The Johansen cointegration test showed that there is at least one long-run relationship (cointegration) between tourism revenue (or service volume), regional GDP and investment [15].
2. The VECM analysis showed that, despite short-term disturbances, the system returns to long-run equilibrium through the error-correction mechanism, the error-correction (ECT) coefficient is negative and statistically significant, which indicates the speed of recovery of the economic system from the discrepancy.
3. The results of the Granger causality test showed that investment and the number of international flights Granger-caused tourist flows, and tourist flows Granger-caused regional GDP, indicating a bidirectional effect between the economy and tourism.

The long-run relationship shows a strong link between tourism and economic growth: increased investment and improved transport and logistics stimulate sustainable tourism growth, which in turn increases GDP. At the same time, the existing interactions require policy coherence - for example, infrastructure projects and marketing campaigns should be coordinated simultaneously [16].

Comparative (interregional) analysis:

1. Samarkand region is in a leading position in terms of total tourist flow and international recognition compared to Bukhara and Khiva; but lags behind Tashkent in terms of commercial and conference tourism.
2. Samarkand's strength is the international recognition of its historical and cultural heritage and its convenience for transport; its weakness is seasonality and low quality in some service segments.

Over the years, we can witness an increase in the volume of tourist services in Samarkand region due to the attention paid to the tourism sector. As a result, this process had a positive impact on the socio-economic situation of the region, see Figure 2.

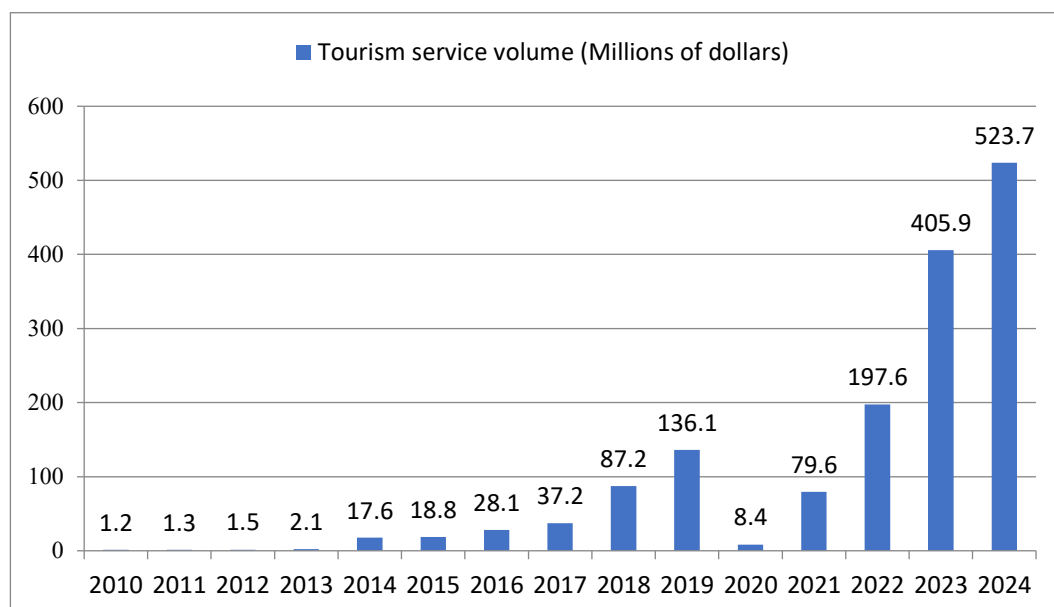


Figure 2. Volume of tourism services provided in Samarkand region between 2010 and 2024.

To increase competitiveness, it is advisable to diversify products in Samarkand (ecotourism, gastronomic tourism, MICE - meetings, incentives, conferences, exhibitions) and organize attractive events throughout the year.

4. Conclusion

The results of the research showed that the tourism sector of Samarkand region has had a stable growth trajectory over the past decade and is becoming one of the strategic sectors of the regional economy. The steady increase in the flow of foreign and domestic tourists, a significant expansion of the volume of tourism services, and the activation of investment processes have led to the fact that the share of tourism in the regional gross regional product has reached 6–7%.

Dynamic and econometric analyses have revealed a strong positive correlation between tourism development and economic indicators ($R^2 \approx 0.82$). This proves that the tourism sector is not only a source of economic income, but also an important factor shaping the international image of the region. At the same time, it was found that the quality of services, seasonality, personnel qualifications, and environmental threats can negatively affect the sustainable development of the sector.

From the point of view of practical importance, the research results serve as an important source for the formation of tourism policy and strategic planning processes in the region. In particular, such areas as bringing the quality of services into line with international standards, modernizing the personnel training system, reducing the problem of seasonality, widespread introduction of digital technologies, and ensuring environmental sustainability are of priority.

Also, expanding international cooperation and actively involving local residents in tourism processes will help increase the socio-economic efficiency of tourism in the Samarkand region. On this basis, the results of this study can be directly used in making scientifically based decisions, planning investment projects, and developing strategic programs for the development of regional tourism.

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