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# Scientific Analysis of the Socio-Economic Effectiveness of Ecotourism in the Jizzakh Region and Prospects for its Development

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**Abstract:** The article evaluates the socio-economic effectiveness of ecotourism, an important direction of the regional tourism system, based on comprehensive scientific indicators. The research findings show that the region has a high potential of natural resources, but there are still sufficient factors hindering the development of the sector. At the same time, it was determined that the development of ecotourism can accelerate regional economic growth, increase employment, expand service exports, and strengthen regional competitiveness. At the end of the study, scientifically grounded proposals and recommendations were developed.

**Keywords:** Ecotourism, Regional Economy, Efficiency, Sustainable Development, Macroeconomic Factors, Econometric Methods, Service Exports, Tourism Infrastructure

## 1. Introduction

Along with the increasing importance and role of tourism's socio-economic development in the developed countries of the world, special attention is being paid to determining the prospects and opportunities for developing ecological tourism under conditions of deepening globalization. "Tourism accounts for 6.0% of global gross domestic product, 7.0% of total investments, 10% of created jobs, and 10% of the volume of services produced worldwide" [1]. This indicator confirms that tourism has not only economic but also social significance.

In recent years, diversification of the tourism sector in Uzbekistan, particularly the development of ecotourism based on the unique potential of regions, has become one of the priority directions of the national economy.

The Jizzakh Region is an area rich in natural resources suitable for the development of ecotourism, where mountain ranges, desert-adjacent plains, lakes, and protected natural areas are harmoniously combined [2]. The mountainous part of the region, especially around Zomin and Baxmal, stands out for its juniper forests, clean mountain air, and rich flora and fauna, and the Zaamin National Park located here is considered one of the oldest protected areas in Uzbekistan and an important destination for ecotourism, trekking, and scientific observation tours [3].

The territory of the Nurata Nature Reserve, situated near the eastern-southern part of the region, is also of great importance for ecological travel as a biosphere zone preserving rare species of animals and plants [4]. At the same time, the Aydar Arnasay

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Lakes System, where desert landscapes and aquatic ecosystems are combined, creates opportunities for developing areas such as fishing tourism, birdwatching, and nature photography [5].

According to specialists, the relatively low level of industrialization, ecological cleanliness, and well-preserved natural landscapes of the region make Jizzakh one of the most promising ecotourism regions of Uzbekistan.

Assessing the impact of ecotourism on the regional economy on a scientific basis, identifying factors hindering the sector's development, and forecasting future development trends are of great importance. Therefore, in this study, statistical data covering 2015–2024 for the Jizzakh Region were selected in order to evaluate the main macroeconomic factors influencing changes in the volume of tourism service exports in the region. Research shows that not all areas rich in natural resources demonstrate high tourism efficiency, since economic outcomes depend more on management and infrastructure than on the mere availability of resources. For this reason, the use of scientifically grounded methods, such as time-series analysis, is considered important in the development of regional tourism.

#### Literature Review

An analysis of existing literature on the scientific study of ecotourism shows that this field has been examined by many academic schools based on different theoretical approaches. The term “ecotourism” was initially proposed not by scholars but by marketers, and it emerged as a result of the growing demand from tourists wishing to travel to natural environments. Its first definition was introduced in 1980 by Mexican economist-ecologist Hector Ceballos-Lascurain [6]. According to him, ecological tourism combines travel to nature with environmentally sensitive behavior, enabling people to experience the joy of observing and studying flora and fauna while contributing to nature conservation.

Among influential international organizations, the World Tourism Organization defines ecotourism as “travel to relatively undisturbed natural areas,” while the World Wildlife Fund describes it as “a form of natural tourism that contributes to environmental protection” [7].

The working group on ecotourism of the German Federal Ministry for Economic Cooperation and Development proposed the following definition: “ecotourism is a form of tourism that seeks to minimize negative environmental impacts, support the financing of protected areas, and create income sources for local populations” [8].

According to researcher I. Yendjeychik, the economic essence of tourism largely relies on its broad multiplier effect [9]. As a result of this multiplier effect, one job created in tourism can generate up to seven additional jobs in other sectors linked to the tourism system.

The introduction of ecological tourism services leads to improvements in local infrastructure, the creation of new jobs in reserves and national parks, and increases in residents' incomes. This positively affects sustainable local economic growth, raises employment levels in rural areas, and improves social conditions [10].

Recent scientific studies show that integrated approaches are gaining priority in assessing tourism efficiency. Such approaches make it possible to analyze economic, social, and environmental indicators within a single system and serve as an important scientific basis for developing regional development strategies.

## 2. Methodology

The research methodology is based on a systematic scientific approach and employs modern econometric methods, including stationary series analysis, the Augmented

Dickey–Fuller (ADF) stationarity test, the Johansen cointegration test, and the Vector Error Correction Model (VECM).

One of the first and most important stages of econometric modeling is determining the statistical properties of time series, particularly testing their stationarity. A stationary series is one whose mean, variance, and covariance remain constant over time, and such properties are a necessary condition for regression analysis. Otherwise, if variables are non-stationary, classical regression results may be spurious and therefore unsuitable for economic interpretation. Using the ADF test, it is determined whether each variable is stationary at its level and at its first difference. To evaluate cointegrated time series, the Vector Error Correction Model (VECM) is applied. The VECM makes it possible to simultaneously analyze long-term equilibrium relationships and short-term deviations between the volume of tourism services and the factors influencing it.

In this study, the main factors affecting the development of ecotourism in the Jizzakh Region were examined, including: exports of tourism services ( $Y$ ), investments in the sector ( $X1$ ), number of people employed in tourism ( $X2$ ), number of accommodation facilities ( $X3$ ), and visitor flow ( $X4$ ).

### 3. Results

The assessment of the time series of the analyzed economic indicators using Augmented Dickey–Fuller tests showed that the statistical values exceed the critical value at the 5% significance level, indicating the existence of at least one cointegrating vector (equation) among the variables. In economic terms, this means that investments in tourism, infrastructure, and tourist flows in the Jizzakh Region do not operate independently but function as a unified system that ensures the stable long-term growth of tourism service volumes [11].

The results of the VECM model, constructed to deeply study the interrelationships among factors affecting changes in ecotourism service exports, play an important role in determining strategies for developing ecotourism in the region [12], [13]. The analysis indicates that priority should be given not only to infrastructure development (supply) but also to stabilizing tourist flows (demand), since tourist flow is the main driving force that increases revenue.

At the final stage of the analysis, forecast indicators for ecotourism service exports in the region for 2025–2030 were developed using the forecasting module of the STATA software (Table 1).

**Table 1.** Forecast Indicators of Tourism Service Export Volume in the Jizzakh Region (2025–2030) (million US dollars)

Years	Pessimistic Scenario (Lower Bound)	Realistic Scenario (Optimal Forecast)	Optimistic Scenario (Upper Bound)
2025	397.2575	<b>1381.455</b>	4806.142
2026	541.6597	<b>1905.431</b>	6702.853
2027	747.1072	<b>2628.147</b>	9245.198
2028	1030.48	<b>3624.984</b>	12751.84
2029	1421.334	<b>4999.915</b>	17588.52
2030	1960.435	<b>6896.348</b>	24259.72

Source: Prepared using the Stata MP15 software

Between 2025 and 2030, the forecast of tourism service export volumes in the Jizzakh Region was assessed based on three scenarios: lower (pessimistic), optimal (realistic), and upper (optimistic) bounds. These forecasts were formed considering the region's economic conditions, investment activity, and the level of development of ecotourism infrastructure, illustrating the potential range of growth.

The results indicate that the pace of economic growth in Jizzakh over the coming years will depend on multiple factors [14], [15]. In particular, the introduction of green technologies at ecotourism sites, rational use of natural resources (mountain and lake areas), and improvements in the investment environment will play a decisive role in achieving the expected outcomes. Therefore, it is essential for the regional administration and the Tourism Committee to attract internationally branded hotels, improve transport logistics, and ensure continuity in maintaining ecological sustainability. Otherwise, tourist flows may shift to competing regions (e.g., Samarkand Region, Tashkent Region), and inefficient use of resources could occur.

#### 4. Conclusion

The study results indicate that the region possesses the natural and economic conditions necessary for the development of ecotourism. The area is rich in natural landscapes, recreational zones, and ecological resources, making it one of the most promising tourist destinations. At the same time, insufficient infrastructure development, service quality, marketing strategies, and investment activity were identified as the main factors limiting tourism efficiency.

Based on scientific generalization, the following key conclusions were drawn: first, ecotourism can serve as an important driver of regional economic growth; second, tourism development contributes to increasing employment and local incomes; third, strategies developed through a comprehensive approach significantly enhance tourism efficiency; and fourth, the development of ecotourism ensures environmental protection and sustainable development.

As a result of the research and econometric analysis, the following practical recommendations were developed:

- Increase investment attractiveness and develop public-private partnerships (PPPs);
- Improve infrastructure and transport logistics;
- Implement digitalization and develop effective marketing strategies;
- Ensure ecosystem sustainability and enhance human resource capacity.

In addition, strict monitoring must be established in the key ecotourism areas, namely the Aydar-Arnasay Lakes System and Zaamin National Park. It is recommended to set quotas on the number of tourists based on the ecological carrying capacity of the region and to develop incentive mechanisms for facilities that implement waste recycling systems.

If these measures are implemented, the competitiveness of the regional tourism system will increase, and sustainable socio-economic development will be ensured.

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