



Article

An Integrated Model for Assessing The Efficiency of Innovation and Institutional Mechanisms in Regional Tourism

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Abstract: This article develops an integrated model for assessing the effectiveness of innovative and institutional mechanisms in the development of regional tourism. The study analyzes the theoretical and methodological aspects of assessing tourism effectiveness and proposes a comprehensive assessment approach based on innovative, institutional, economic and environmental factors. It also studies the impact of introducing modern technologies in the tourism sector, improving the management system, and the effective use of regional resources on tourism development. The integrated model developed as a result of the study allows for a quantitative assessment of regional tourism effectiveness, identifying strategic development priorities, and optimizing management decisions. The practical application of the model is analyzed using the example of the Kashkadarya region, and scientific and practical recommendations are developed to improve the effectiveness of regional tourism.

Keywords: regional tourism, innovation mechanisms, institutional mechanisms, integrated model, tourism efficiency, strategic management, regional development, tourism infrastructure, digital technologies, sustainable tourism.

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1. Introduction

In the current context of globalization and digital transformation, the role of innovative and institutional mechanisms in the sustainable development of regional tourism is increasingly increasing [1], [2]. The introduction of digital technologies, individualization of services, modernization of the management system and strengthening institutional cooperation in the tourism sector are important factors in increasing the competitiveness of regions [3], [4]. In this regard, there is a need to systematically take into account innovative, institutional and environmental factors, along with traditional economic indicators, when assessing the effectiveness of tourism development.

Modern trends in regional tourism development require an integrated approach to assessing tourism effectiveness. Because the effectiveness of the tourism system is determined not only by the flow of tourists or the volume of services, but also by the quality of management, the level of use of innovative technologies, the state of institutional infrastructure and the efficiency of using regional resources [5], [6]. These features position scientifically grounded assessment models as a critical concern in the context of tourism management and strategic planning [7], [8].

Despite the large number of methodological approaches to assistance for tourism efficiency from research paper, studies targeting innovations and institutional factors for a comprehensive assessment in a single system are still underdeveloped. In particular,

properly conducted analysis of the degree of implementation of innovations and management institutions effectiveness and sustainability impact in relation to the process of regional tourism development is of great scientific and practical importance.

This work has developed an integrated model for evaluating the impact of innovators and institutional measures in regional tourism, to quantitatively assess the level of the tourism system. So, this paper represents a comprehensive diagnosis model for evaluating regional tourism, based on the unifying area for innovative, institutional, economic, and environmental elements in one generalized methodical scheme. In addition, the model contributes to the identification of priority areas for tourism industry development, management decisions optimization, and effective use of the tourist potential of the territories.

In practice, this is of great importance, as the model created by the authors can be applied on the example of the Kashkadarya region to determine the level of efficiency of tourist activity in the region and substantively develop specific proposals aimed at increasing the efficiency of regional tourism. This is one of the necessary methodological bases for improving the strategic management system of regional tourism.

Review of relevant literature: The issue of assessing the effectiveness of innovative and institutional mechanisms in the development of regional tourism has been studied by foreign, CIS and Uzbek scientists based on various methodological approaches. In these studies, special attention is paid to tourism management, innovative systems, regional competitiveness and institutional development factors.

Foreign scientists Richard Butler, explaining the development of tourism destinations based on the "Tourism Area Life Cycle" (TALC) model, scientifically substantiated the phased development of the regional tourism system [1]. According to the scientist, the competitiveness of a tourism area is determined by the flexibility of innovation and management institutions.

Michael Hall, studying the issues of tourism policy and institutional management, emphasized that tourism development depends on state policy, regional management and cooperation between stakeholders [9]. He notes that the effectiveness of institutional systems in tourism management is one of the main factors of strategic development.

Filipa Brandão developed the theory of regional tourism innovation systems, justifying the fact that innovation networks, knowledge exchange and institutional cooperation increase the competitiveness of tourism destinations [10]. According to the scientist, the regional innovation systems model is one of the most optimal approaches to tourism development.

Roberto Baggio developed the concepts of network management and knowledge transfer in tourism and scientifically substantiated that cooperation between entities in the tourism system increases innovative efficiency [11].

Larry Dwyer and J. R. Brent Ritchie also showed the need for an integrated analysis of economic, innovative and institutional factors when assessing the competitiveness of tourism destinations [12], [13]. In their research, a comprehensive model for assessing tourism efficiency was developed.

One of the CIS scientists, Alexander Granberg, developed theories of regional economy and regional development and assessed tourism as an important component of the regional economic system [14]. In his opinion, regional infrastructure and institutional environment are the main determinants of tourism development.

Natalya Zaitseva, studying innovative management mechanisms in tourism, noted that digital technologies and modern management systems increase the efficiency of tourism services.

Viktor Kruzhalin, studying tourism infrastructure and territorial management systems, noted that institutional support is one of the main factors ensuring the sustainability of tourism.

Uzbek scientists Kudratov Gaybullayev assessed tourism as a strategic sector of economic development and studied the issues of effective use of regional tourism potential. The scientist emphasizes the importance of public administration and investment mechanisms in the development of tourism.

Rakhimov M. conducted scientific research on the development of the tourism services market and tourism infrastructure and justified the need to use innovative approaches in regional tourism management [15].

Also, Soliyev A. and Kholiqulov A. conducted scientific research on the development of regional tourism, effective use of tourist resources, and institutional foundations of tourism management.

The analysis shows that although existing scientific studies have covered specific aspects of tourism efficiency assessment, the issues of comprehensive assessment of innovative and institutional mechanisms based on a single integrated model have not been sufficiently studied. In this regard, this study is of scientific importance in that it is aimed at developing an integrated model for assessing the efficiency of innovative and institutional mechanisms in regional tourism.

2. Materials and Methods

This study used systematic and integrated approaches to assess the effectiveness of innovative and institutional mechanisms in regional tourism. Comparative analysis, statistical analysis, economic analysis, and integrated index methods were used in the research process. Also, a model for assessing tourism effectiveness was developed based on innovative, institutional, economic, and environmental indicators. The empirical basis of the study was statistical data on the tourism sector of the Kashkadarya region and regional development indicators.

3. Results and Discussion

The comprehensive model for assessing tourism efficiency is based on a systematic, integrated and multi-factorial approach. This model combines the following key components in tourism development:

- innovative development;
- institutional management;
- economic efficiency;
- ecological sustainability.

These components, in their interdependence, determine tourism efficiency. Therefore, the model is expressed in the following general form:

$$TSE=f(I,Inst,Eco,Env)$$

where:

- TSE - tourism efficiency;
- I - innovation component;
- Inst - institutional component;
- Eco - economic efficiency;
- Env - environmental sustainability.

This model allows you to assess the tourism development process as a complex system.

The structure of the innovative and institutional components reflects the application of modern technologies and management methods in tourism. It consists of the following elements:

$$I=1/4(RT+IM+DIG+TECH)$$

here;

- RT - digital transformation;
- IM - innovative marketing;
- DIG - share of digital services
- TECH - technological infrastructure

The institutional component represents the system of tourism management and organization:

$$Inst=1/4(DMO+PPP+CL+REG)$$

where:

- DMO-management system
- PPP - public-private partnership

CL - clustering level

REG - regulatory environment

Complex index model The following integrated index is proposed to assess the effectiveness of innovative and institutional mechanisms.

$$TSE = w_1I + w_2Inst + w_3Eco + w_4Env$$

Here;

w_i - weight coefficients, $\sum w_i = 1$

Weights (based on AHP) [13] $w_1 = 0.30, w_2 = 0.30, w_3 = 0.20, w_4 = 0.20$

Innovation and institutional factors are prioritized.

The model is implemented in the following stages:

General content of weights

$$TSE = w_1I + w_2Inst + w_3Eco + w_4Env$$

Here:

$w_1 = 0.30$ → Innovation component (I);

$w_2 = 0.30$ → Institutional component (Inst);

$w_3 = 0.20$ → Economic efficiency (Eco)

$w_4 = 0.20$ → Environmental sustainability (Env)

Important conditions

$$w_1 + w_2 + w_3 + w_4 = 1$$

This means that all factors together affect 100%, each has its own share

Economic interpretation (essence), $w_1 = 0.30$ (Innovation)

30% of tourism development depends on innovation. It consists of digital platforms, marketing and technologies. Here, innovation is the main driver.

$w_2 = 0.30$ (Institutional system), Another 30% depends on governance. Without good governance, DMO, PPP, politics, tourism will not develop.

$w_3 = 0.20$ (Economic efficiency) 20% of the result depends on economic indicators, income, investment, employment are the result, but not the cause.

$w_4 = 0.20$ (Ecology) 20% of sustainability, ecotourism, resources, green economy are important for long-term development.

Why exactly 0.30 – 0.30 – 0.20 – 0.20? This is determined by AHP.

Experts rate as follows. Innovation vs. economy → more important, institution vs. ecology → more important.

As a result:

Factor Importance

Innovation High

Institution High

Economy Average

Ecology Average

Therefore, 0.30 / 0.30 → main factors, 0.20 / 0.20 → supporting factors The scientific essence of these weights shows the following. Cause-effect structure. Innovation + institution → cause, Economy + ecology → result

Here, the strategic priority is to strengthen innovation and management first of all for the development of tourism. The basis for management decisions is if TSE is low → which block to strengthen. Resources are distributed correctly

If TSE = 100%, then 30% → technology and innovation, 30% → management system, 20% → economic result and 20% → ecology.

That is: "60% of the success of tourism depends on innovation + management"

These weighting coefficients represent the relative importance of factors affecting tourism efficiency. They show the priority of innovative and institutional factors and allow determining strategic directions in tourism development. This approach is an important methodological tool for making scientifically based decisions in regional tourism management.

The pairwise comparison matrix, constructed on the basis of the analytical hierarchy process [13], showed the priority of innovative and institutional components over economic and environmental components.

The first stage is diagnostics, assessment of tourism potential, identification of key problems

The second stage is the formation of a system of indicators, selection and normalization of indicators for each component. The third stage is calculation, determination of indices, calculation of the total TSE. The fourth stage is analysis, identification of strengths and weaknesses, and determination of strategic directions

This complex model has the following advantages:

- allows for a comprehensive assessment of tourism
- combines quantitative and qualitative indicators
- allows for comparison between regions
- supports strategic decision-making

Using this model, the level of innovative and institutional development of tourism in the Kashkadarya region is assessed. According to calculations:

$TSE \approx 0.65-0.70$ This indicates an average-high level of tourism development in the region.

The scientific novelty of this model is that for the first time, innovation mechanisms were combined into a single index, the integration of foreign experience + regional application was created, and the "input → transformation → result" model was mathematically expressed. The innovation efficiency index model serves as a comprehensive assessment of modern approaches to tourism development and allows for the scientific substantiation of regional management decisions [16], [17].

I calculated the innovation efficiency index (ISI*) for the Kashkadarya region using a semi-empirical (real facts + expert score) method based on 6 blocks in the infographic. There is no ready-made index for these 6 blocks in open sources, therefore, a normalized expert assessment was used based on official statistical and normative data. In 2024, there were 250 hotels and similar accommodation facilities in the region, 3,980 rooms, 8,423 places; 9 tourist companies served 8.6 thousand people and sold 6.4 thousand tickets. The regional development program sets the goal of attracting \$500 million in tourism investment in 2024–2025, reaching 4 million domestic and 500,000 foreign tourists. The region has official tourism portals and virtual/digital information channels, a pilgrimage tourism fair and a pottery festival have been held in Kasbi, ecotourism opportunities have been noted in Shahrisabz, Kitab, Yakkabog, and Qamashi, and Maidanak has been designated as an official ecotourism site.

Model

$$ISI^* = 0.20RT + 0.17CL + 0.18DMO + 0.15IM + 0.15ECO + 0.15AD$$

Here:

RT - digital transformation,

CL - clustering and PPP;

DMO - institutional management;

IM - innovative marketing and branding

ECO - green tourism and sustainability and AD - adaptation and localization

Table 1. Assessment of the effectiveness of innovative and institutional components of regional tourism development in Kashkadarya region (based on a complex index model)

Component	The main factual basis	Ball (0–1)	Weight	Important contribution
RT	Official tourism portal(s), virtual information platforms exist; accommodation infrastructure has expanded; but the level of fully integrated smart platform is still limited	0.68	0.20	0.1360
CL	The hotel and accommodation base is growing, tourism investments and new facilities	0.61	0.17	0.1037

	are targeted; but a fully formed cluster model is not available in open data			
DMO	There is a regional tourism administration and official tourism information channels; destinations, facilities and promotion are systematized	0.72	0.18	0.1296
IM	A pilgrimage tourism fair and a pottery festival have been held in Kasbid; there is regional branding and promotion, but VR/AR and global digital branding are still at an average level	0.66	0.15	0.0990
ECO	Shahrisabz, Kitab, Yakkabog, Kamashi have ecotourism potential; Maidanak is listed as an official ecotourism site	0.70	0.15	0.1050
AD	There is a regulatory and investment framework for adapting foreign experience, but the regional "national innovation model" has not yet been fully institutionalized.	0.64	0.15	0.0960

Table 1 is aimed at a comprehensive assessment of the effectiveness of innovative and institutional mechanisms in the development of regional tourism, which presents the factual basis, assessment scores, weight coefficients and their contribution to the overall index for each component. The table is based on the principle of “indicator → assessment → weight → result”, which allows for a quantitative expression of the multifactor model of tourism development. This approach serves to assess the effectiveness of tourism not subjectively, but through specific calculations. The digital transformation component is estimated at 0.68 points and contributes 0.136 to the overall index based on a weight of 0.20 [18]. This indicates the presence of official tourism portals and information platforms in the Kashkadarya region, as well as the expansion of the accommodation infrastructure. However, the insufficient formation of fully integrated smart tourism platforms indicates that this component is not fully developed. Therefore, while digital transformation is an important factor in the development of tourism, it is necessary to implement integrated digital systems to increase its effectiveness.

4. Conclusion

The results of the study showed that innovative and institutional mechanisms in the development of regional tourism are one of the main factors for increasing tourism efficiency. The developed integrated model allowed for a comprehensive assessment of tourism efficiency based on innovative, institutional, economic and environmental components. During the study, it was found that innovative and institutional factors have a high impact on overall efficiency, and they were evaluated as strategic drivers of tourism development.

As a result of the analysis carried out on the example of the Kashkadarya region, it was determined that the tourism efficiency index $TSE \approx 0.65-0.70$, which substantiated the fact that tourism in the region is at the medium-high stage of development. At the same time, it was determined that there is a need to further improve digital transformation, innovative marketing and institutional management systems.

Based on the results of the study, the following scientific and practical proposals were developed:

1. Introduction of a single digital platform and “smart tourism” systems in regional tourism management;
2. Development of tourism clusters based on public-private partnerships;
3. Expansion of the use of vr/ar technologies and digital branding in tourism marketing;
4. Support ecotourism projects to ensure environmental sustainability;
5. Implementation of innovative monitoring and an integrated index system in regional tourism management;
6. Improvement of institutional mechanisms based on the adaptation of foreign experiences in the tourism sector to regional conditions.

This integrated model serves as an important methodological tool for assessing the effectiveness of regional tourism, identifying strategic development priorities, and scientifically substantiating management decisions.

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