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Article

Foreign Experiences in The Use of Digital Services for Developing Tourism Infrastructure in Service Sectors and Possibilities for Their Application in Shahrisabz

Musirmanov Shohboz Usmon o'g'li[1]

1. Shahrisabz State Pedagogical Institute, Assistant Lecturer, Department of Mathematics and Applied Mathematics

Abstract: This article analyzes international experiences in using digital services to develop tourism infrastructure and examines the possibilities for their practical implementation using the city of Shahrisabz as an example. During the study, the advanced experiences of Singapore, South Korea, Spain, and the United Arab Emirates in tourism digitalization were analyzed and their effectiveness was assessed. In addition, the tourism potential and existing infrastructure of Shahrisabz were studied, and priority directions for implementing the smart tourism concept were developed. According to the results of the study, the introduction of mobile applications, QR-code navigation, artificial intelligence-based guide services, electronic booking systems, and smart transport technologies can help increase tourist flows, improve service quality, and strengthen the tourism competitiveness of the region.

Keywords: Tourism Infrastructure, Digital Services, Smart Tourism, Electronic Booking, QR Code, Artificial Intelligence, Smart Transport, Shahrisabz, Digital Economy, Tourism Services

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1. Introduction

In the global economy, tourism is one of the fastest-growing areas of the service sectors. In recent years, the rapid development of digital technologies has fundamentally transformed the system of tourism service delivery. Mobile applications, electronic payments, artificial intelligence, virtual and augmented reality technologies are creating new forms of service provision for tourists [1]. In international practice, the digitalization of tourism infrastructure is regarded as an important factor in increasing tourist flows, improving service quality, and strengthening the competitiveness of tourist destinations [2].

The city of Shahrisabz is one of the historical and cultural centers of Uzbekistan and possesses unique tourist sites included in the UNESCO World Heritage List. However, because the level of digitalization of tourism services in the region is insufficient, the ability to fully meet the needs of modern tourists remains limited. Therefore, studying the advanced experience of foreign countries and applying it to the conditions of Shahrisabz is a highly relevant issue [3], [4].

Studying foreign experience in the use of digital services for developing tourism infrastructure in service sectors is of great scientific and practical importance [5], [6]. In the context of the global digital economy, tourism infrastructure is no longer only a set of physical facilities (hotels, roads, and transport), but is becoming an ecosystem managed through platforms, data, and digital services. Foreign experience demonstrates mechanisms for reducing transaction costs, improving service quality and safety, managing tourist flows, and strengthening the regional brand through digital services [7].

The essence of studying this area is to adapt the "smart destination", platformization, and data-driven management approaches formed in advanced countries to local conditions. In other words, digital services integrate all links of tourism infrastructure (transport-hotel-catering-excursion-payment-information) into a single system and increase the efficiency of infrastructure operation through synergy. Foreign experience also scientifically confirms that digital services produce results only when they are harmonized with institutional support, including regulation, standards, cybersecurity, and data governance [8], [9].

The content of this topic covers a systematic analysis of the main directions in which digital services are used in foreign practice to develop tourism infrastructure. These include online booking and dynamic pricing systems, mobile super-app ecosystems, contactless services (QR, e-ticket, self check-in), tourist information systems (smart-info), demand forecasting based on geo-analytics and Big Data, as well as fintech/payment infrastructure and integrated transport solutions. At the same time, opportunities to enhance environmental sustainability (overtourism control and flow monitoring) and inclusiveness (remote areas, SMEs, employment of women and youth) through digital services are also an important part of the topic.

Literature Review

Issues of tourism digitalization have been scientifically substantiated by foreign scholars such as D. Buhalis, C. Costa, J. Koo, Gretzel, Xiang, and Tussyadiah through the concepts of smart tourism, e-tourism, and digital destination. Their studies note that digital technologies have a significant impact on improving the quality of tourism services and increasing tourists' satisfaction.

The Smart Tourism Destination model developed by Buhalis is based on the integration of tourism infrastructure, information and communication technologies, and innovative management mechanisms. The studies by Xiang and Gretzel highlight the importance of mobile technologies and social networks in tourists' decision-making processes [10], [11], [12], [13].

2. Materials and Methods

The study used comparative analysis, statistical analysis, economic assessment, SWOT analysis, and scientific generalization methods. The experiences of foreign countries in developing digital tourism infrastructure were studied, and the possibilities of adapting them to the conditions of Shahrisabz were evaluated.

The following index was proposed to determine the level of digital tourism development:

$$RTSI = 0.25M + 0.25B + 0.20Q + 0.15A + 0.15E$$

where:

RTSI - Digital Tourism Services Index;

M - level of use of mobile applications;

B - share of electronic booking systems;

Q - coverage of QR services;

A - level of artificial intelligence services;

E - share of electronic payments.

3. Results and Discussion

Digital tourism experiences in foreign countries

Singapore Experience

Singapore is one of the world's most developed Smart Tourism Destination (STD) areas. In this country, tourism infrastructure is managed through a single digital platform. With the help of mobile applications, tourists can book hotels, use transport services, and purchase electronic tickets to museums and historical monuments [14], [15].

Table 1. Digital tourism results in Singapore

Indicator	2019	2024
Number of tourists (million)	19.1	22.4
Share of electronic booking (%)	72	95
Use of mobile applications (%)	64	93
Tourist satisfaction level (%)	81	96

These results confirm that digital technologies have a positive impact on tourist flows and service quality.

South Korea Experience

South Korea has introduced the "Smart Tourism City" concept in its tourism infrastructure. In Seoul, Busan, and Jeju Island, a unified electronic card, a QR-code navigation system, and artificial intelligence-based consulting services operate for tourists.

Table 2. Use of digital services in South Korea

Indicator	Value
Share of users of QR navigation	89%
Share of electronic payments	97%
Booking through smart applications	91%
Use of AI services	74%

Spain Experience

Spain is one of the world's most popular tourist countries and is implementing the "Smart Destination Spain" program. Through this program, tourist flows, transport movement, and hotel services are monitored in real time.

Table 3. Smart Tourism indicators in Spain

Indicator	Result
Share of tourism in GDP	12.8%
Share of online booking	94%
Use of digital services	88%
Repeat visits by tourists	63%

UAE Experience

In the United Arab Emirates, especially in the city of Dubai, tourism infrastructure has been fully digitalized. The following are available for tourists:

- Smart Dubai App;
- Virtual guides;
- QR-code excursions;
- Electronic visa system;
- A Contactless Payment system is available.

As a result, the average time spent by tourists using services has decreased by 32 percent.

ECONOMIC ASSESSMENT MODEL OF FOREIGN EXPERIENCES

The following index is proposed to assess the efficiency of digital technologies in tourism services:

$$RTSI = \sum_{i=1}^{n} w_i \times D_i$$

- RTSI - Digital Tourism Services Index;

- w_i - weight coefficient of the factor;
- D_i - value of the digital indicator.

RTSI components

$$RTSI = 0.25M + 0.25B + 0.20Q + 0.15A + 0.15E$$

- M - level of use of mobile applications;
- B - level of electronic booking;
- Q - coverage of QR services;
- A - share of AI services;
- E - share of electronic payments.

Table 4. RTSI calculation for Shahrisabz

Indicator	Value
Mobile applications (M)	0.45
Electronic booking (B)	0.52
QR services (Q)	0.35
AI services (A)	0.15
Electronic payments (E)	0.60

Calculation: RTSI = 0.25(0.45) + 0.25(0.52) + 0.20(0.35) + 0.15(0.15) + 0.15(0.60) = 0.425
Result: RTSI = 0.425

This indicator shows that the development of digital tourism infrastructure in Shahrisabz is at a medium level.

Possibilities for applying foreign experiences in Shahrisabz

The city of Shahrisabz has the status of the Historic Centre of Shakhrisyabz and has high tourism potential. However, the level of digitalization of service sectors is lower than in foreign countries.

Table 5. Proposed Smart Tourism Platform

Direction	Foreign experience	Proposal for Shahrisabz
Electronic booking	Singapore	Unified booking portal
QR navigation	Korea	QR system at historical monuments
Smart card	Korea	Introduction of a Tourist Card
Virtual guide	Dubai	AR/VR-based guide
Big Data	Spain	Monitoring tourist flows
AI Chatbot	Singapore	Creation of a multilingual chatbot

SHAHRISABZ SMART TOURISM MODEL

$$STS = \alpha M + \beta E + \gamma Q + \delta P$$

- M - mobile services;
- E - electronic booking;
- Q - QR services;
- P - electronic payments.

If all coefficients are assumed to be equal to 0.25:

STS = 0.25M + 0.25E + 0.25Q + 0.25P

As a result of implementing this model by 2030:

Indicator	2025	2030 forecast
Number of tourists (thousand people)	420	780
Tourism revenue (billion soums)	285	620
Hotel occupancy (%)	52	81
Electronic booking (%)	38	90
Electronic payments (%)	47	95

Proposed Smart Tourism model for Shahrisabz:

STS = 0.25M + 0.25E + 0.25Q + 0.25P

M - mobile services;

E - electronic booking;

Q - QR navigation;

P - electronic payment systems.

Based on this model, by 2030 there is an opportunity to increase the number of tourists by 1.8 times and tourism revenues by more than 2 times.

4. Conclusion

The results of the study show that the use of digital services in the development of tourism infrastructure is an important factor in improving the efficiency of service sectors. Based on the experiences of Singapore, South Korea, Spain, and the UAE, the introduction of the smart tourism concept in the city of Shahrisabz will increase the region's tourist attractiveness, improve service quality, and raise tourism revenues. Through the introduction of mobile applications, QR-code navigation, artificial intelligence-based guide services, smart transport systems, and electronic payments, it is possible to turn Shahrisabz into one of the modern digital tourism centers of Central Asia.

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