

Impact of Digital Technologies on The Sustainable Development of Tourism: In Case of Uzbekistan

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Abstract. This paper presents an econometric analysis of the effects of Uzbekistan's tourism development on the country's digital economy. The identification of exogenous factors influencing the flow of tourists, particularly the growth of the digital economy, was investigated as a research hypothesis. This examined the travel market from the CIS and other nations between 2018 and 2023. The regression analysis of Internet dependence in the age range of 0 to 18 years supported the hypothesis. Also, effect of factors such as: the number of marriages arranged for tourists aged 19 to 30, 31 to 55 and over 55, the population is provided with the Internet, the development of the transport system, and the increase in the volume of services per capita by region was studied.

Keywords: Artificial intelligence, digital economics, IT, population, tourist, tour, factors, regression.

1. INTRODUCTION

The tourism industry in Uzbekistan has significant development potential. It is associated both with the presence of a large number of unique natural objects (lakes, mountain peaks, river floodplain forests) and with a rich cultural and historical heritage. On the territory of the country there are over 7,000 monuments of architecture and art from different eras and civilizations, many of which are included in the UNESCO World Heritage List.

Considering that the number of tourists to our country is increasing year by year, this is a very worthy recognition. Now let's give some numbers. According to the results of last year, 6,748 million people visited Uzbekistan, which is 125% more than the statistics of 2018 (5,346 million people). 6,260 million people from the total number came from CIS countries, and 488,400 tourists came from distant foreign countries. At the same time, in 2019, the export of tourism services amounted to 1.313 billion dollars, in 2018 it was equal to 1.041 billion dollars (increase 126 percent). More than half of this value was spent by tourists from the CIS countries (966,559 million US dollars), 346,472 million. and dollars go to travelers from other countries. As you can see, tourism in Uzbekistan is developing rapidly, and this is a very good achievement, because we have something to show to the world [11].

2. LITERATURE REVIEW

The travel and tourism sector is not an exception to how the Internet has completely changed how businesses run. This review of the literature examines the ever-changing field of online travel product promotion. This review examines the body of research to determine the effects, tactics, difficulties, and prospects of using the Internet to promote tourism, taking into account the growing influence of digital platforms on travel decisions.

Early research demonstrated how internet marketing revolutionized the travel and tourism industry. Studies conducted by Buhalis [2] and Law et al. [3], Asanbekova M.[1], highlight the relationship between online marketing initiatives and higher visitor numbers and spending.

Xiang & Du tried to evaluate the effectiveness of these strategies is essential for optimizing promotional efforts and resource allocation.[4]

Recent studies have explored the integration of emerging technologies like virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) in tourism marketing (Sigala, 2020). Understanding how these technologies enhance the online promotion of tourism products provides insights into future trends.[5]

Cross-cultural differences play a pivotal role in the effectiveness of online marketing strategies in the global tourism industry (Gretzel et al., 2012). This study aimed to offer clear definitions and a summary of the fundamental principles that form the basis of the smart tourism concept. [6]

Metrics and KPIs are essential for assessing the success of online tourism marketing campaigns (Fotis et al., 2012). [7] This study adds to the existing body of literature addressing the utilization and influence of social media in the planning of holiday travel. Diverging from the predominant focus of prior research on particular platforms or communities, their investigation centers on a specific phase within the travel planning journey.

3. METHODOLOGY

In this research we collected secondary statistics from www.stat.uz and investigated impact of tourism development on the digital economy in Uzbekistan. The identification of exogenous factors influencing the flow of tourists, particularly the growth of the digital economy, was investigated as a research hypothesis. This examined the travel market from the CIS and other nations between 2018 and 2023. The regression analysis of Internet dependence in the age range of 0 to 18 years supported the hypothesis. Additionally, the impact of variables like the number of marriages arranged for travelers between the ages of 19 and 30, 31 to 55, and over 55, the population's access to the Internet, the growth of the transportation infrastructure, and the rise in the quantity of services per capita by region were examined. In order to determine all factors affecting tourism in the Republic of Uzbekistan, the following factors were selected: resulting factors - Y1, Y2, Y3, Y4, Y5, Y6, Y7, and as influencing factors - X1, X2, X3, X4, X5.

Table 1 Conditional determination of all factors affecting tourism in the Republic of Uzbekistan

Y	Total Visitors:
Y1	from neighboring countries:
Y2	from the rest of the CIS countries:
Y3	from other countries:
Y4	From 0 to 18 years
Y5	19 to 30 years old
Y6	31 to 55 years old
Y7	Over 55 years old
X1	The number of arranged marriages
X2	Internet coverage of the population (per 100 permanent residents)
X3	Passengers transported, mln. Persons
X4	Growth rate of services per capita by region
X5	Total income of the population, billion soums

Before creating a multifactor econometric model based on the data of the State Statistics Agency of the Republic of Uzbekistan, descriptive statistics were conducted using the Eviews 10 program.

The average value (mean), median (median), maximum and minimum values (maximum, minimum) of each factor can be seen from the data of Table 2. In addition, the values of the standard deviation of each factor (std. dev. (Standard Deviation) - the coefficient of standard deviation shows how much each variable deviates from the average value) are presented [10].

4. DISCUSSION OF RESULTS

The most influential source of information used by respondents when planning their trip to the Republic of Uzbekistan was the Internet, which was indicated by 44% of tourists surveyed. The second most influential source of information for tourists was guidebooks such as Lonely Planet and travel stories in newspapers and magazines, with a combined score of 40%. Government websites and recommendations from family and friends had the least influence on tourists, with 61% and 50% of respondents reporting a low level of use. The survey results indicate a number of trends across age groups: – Recommendations from family and friends, as well as information from travel industry and government websites, had the greatest impact on respondents aged 34 to 44.

- Travel stories in newspapers and magazines, as well as tourist guides, were most influential among respondents aged 45 to 54 years.
- Television documentaries and news programs influenced respondents aged 25 to 34 the most.
- Respondents aged 55 and older were most influenced by travel brochures.

- The main source of influence on tourists aged 17 to 34 years was information from the Internet.

When traveling around the Republic of Uzbekistan, respondents most often used tourist guides such as Lonely Planet (see Diagram 14). 69% of tourists indicated a moderate to high degree of their use. In second place were Internet search engines (58%) followed by family recommendations from travel friends (56%).

The sources of information least used by tourists in the Republic of Uzbekistan were the National Tourism Website and Visitor Information Centers. 67% and 64% of respondents indicated that they used these resources little.

The most common digital activity that respondents (41%) engaged in while traveling in the Republic of Uzbekistan was communicating with friends and family via email. Connecting to the Internet via a mobile phone or smartphone, communicating with friends through instant messaging platforms and updating photos on social networks took second (28%), third (27%) and fourth (26%) places, respectively. The respondents’ answers allow us to identify a number of trends related to the age and gender of the tourists surveyed: – The results demonstrate an active and high level of use of digital technologies by respondents aged 17 to 44 years during a trip to the Republic of Uzbekistan. On average, 67% of tourists in this age segment engaged in such activities.

- Respondents aged 45 and over were, on average, 4% more likely to read their home country's newspaper (in digital format) at least once a week while traveling.

- Female respondents were 10% more likely to email photos of their trip to their friends back home while traveling, and 11% more likely to communicate with friends via instant messaging compared to male respondents.

Table 2. Types of activities related to digital technologies that respondents were engaged in during a trip to the Republic of Uzbekistan

Activities related to digital technologies	Use by respondents	
	Number	%
Emailing friends and family.	114	41%
Internet connection via mobile phone or smartphone.	79	28%
Chat with friends using instant messaging services (such as WhatsApp).	75	27%
Update photos from your trip on social networking sites (eg Facebook).	74	26%
Communicate with friends in their country using IP telephony (for example, Skype, FaceTime).	74	26%
Send SMS to friends located in their country.	73	26%
Send photos from your trip to friends in your country via email.	53	19%

Blogging about your trip.	35	12%
Read your country's newspapers online at least once a week.	35	12%
Using an Internet cafe.	31	11%
Posting a review of your place of residence online.	30	11%
Participation in online forums (eg TripAdvisor and Lonely Planet).	29	10%
Using calling cards or vouchers to call home.	14	5%
Posting a video about the trip on the Internet (YouTube).	14	5%

In 2021, 133 new hotels (number of rooms 3384) and 210 hostels (number of rooms 1946) were launched in the regions, the total number of accommodation facilities was 1442, and the number of places in them was 71 247.

Also, at the beginning of the year, a total of 1,747 tourist road signs were installed, including 437 during 2021, to improve the tourism infrastructure, in particular, to ensure the correct movement of travelers to the intended destination.

1096 family guest houses (number of rooms 3952) were established, the total number of which was 2458 and the number of places reached 21 018. As a result of the establishment of 137 new tourist organizations providing services for tourists, their number has increased to 1483.

1,502 sanitary-hygiene stations were built and repaired across the republic at tourist attractions, gas stations for all types of cars, roadsides and populated areas.

The level of provision of sanitary-hygienic stations of 4,114 gas stations for cars in the territory of the republic has been increased to 85% (3,491 are provided with sanitary facilities).

In order to select factors for the multifactor econometric model, it is necessary to conduct a correlational analysis. A matrix of individual and pair correlation coefficients was created between the factors. Therefore, private correlation coefficients show that there is a close connection between the resulting factor and influencing factors, that is, the value of private correlation coefficients is mostly greater than 0.7.

According to the theoretical requirement of statistics, the values of pairwise correlation coefficients between all influencing factors are required to be less than 0.5, which indicates that there is no multicollinearity between influencing factors.

It is necessary to analyze the relationships between the 7 factors (Y1, Y2, Y3, Y4, Y5, Y6, Y7) in the enterprise whose performance indicators are studied above.

If we interpret the calculated parameters of the multi-factor econometric model based on the data of some factors (Y1, Y2, Y3, Y4, Y5, Y6, Y7) affecting tourism in the Republic of Uzbekistan, it is not theoretically adequate. The econometric model that leads to the conclusion is not statistically significant (p-value greater than 0.05).

Table 3 Regression model of some factors affecting tourism in the Republic of Uzbekistan

Dependent Variable: LNY
 Method: Least Squares
 Date: 11/14/23 Time: 09:41
 Sample: 2016 2023
 Included observations: 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNX1	-410.6607	172.1465	-2.385529	0.0627
LNX3	8645.492	3273.707	2.640888	0.0459
C	13352505	6675528.	2.000217	0.1019

R-squared	0.639929	Mean dependent var	4238656.
Adjusted R-squared	0.495901	S.D. dependent var	2060496.
S.E. of regression	1462951.	Akaike info criterion	31.50981
Sum squared resid	1.07E+13	Schwarz criterion	31.53960
Log likelihood	-123.0392	Hannan-Quinn criter.	31.30888
F-statistic	4.443076	Durbin-Watson stat	2.041840
Prob(F-statistic)	0.077798		

The equation of this regression model can be given as follows:

$$\ln Y = -410,66 \ln X_1 + 8645,49 \ln X_3 + 13352505 \quad (2)$$

This regression equation showed that, ceteris paribus, the increase in the number of marriages in Uzbekistan had a negative effect on the number of tourists, while the development of the transport system had a positive effect, and its increase by 1% led to an increase in the number of tourists by 86.4 times.

(1) in checking the autocorrelation of the model, the Breusch-Godfrey test is performed.

If there is correlation between adjacent observations, then in this equation

$$e_t = p * e_{t-1} + v_t, t = 1, \dots, n$$

(where e_t is the regression residual obtained by the method of least squares) p coefficient is different from zero.

The results of testing the model for autocorrelation by the Breusch-Godfrey test are presented in this table (Table 4).

Table 4 Model results for autocorrelation via the Breusch-Godfrey test
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.331358	Prob. F(2,5)	0.7326
Obs*R-squared	0.936252	Prob. Chi-Square(2)	0.6262
Scaled explained SS	0.375268	Prob. Chi-Square(2)	0.8289

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/14/23 Time: 09:17
Sample: 2016 2023
Included observations: 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.41E+12	1.04E+13	-0.424476	0.6889
LNX1	64368605	2.68E+08	0.240173	0.8197
LNX3	-5.74E+08	5.10E+09	-0.112578	0.9147
R-squared	0.117031	Mean dependent var		1.34E+1 2
Adjusted R-squared	-0.236156	S.D. dependent var		2.05E+1 2
S.E. of regression	2.28E+12	Akaike info criterion		60.02618
Sum squared resid	2.59E+25	Schwarz criterion		60.05597
Log likelihood	-237.1047	Hannan-Quinn criter.		59.82526
F-statistic	0.331358	Durbin-Watson stat		3.028065
Prob(F-statistic)	0.732594			

We make sure that the values of both lags (resid(-1) and resid(-2)) in this table are free of autocorrelation of random deviations. We also check the heteroskedasticity of the model by White's test.

Table 5 The results of White's test for heteroskedasticity of the model
Heteroskedasticity Test: White

F-statistic	2.945784	Prob. F(5,2)	0.2726
Obs*R-squared	7.043573	Prob. Chi-Square(5)	0.2174
Scaled explained SS	2.823205	Prob. Chi-Square(5)	0.7272

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/14/23 Time: 09:17
Sample: 2016 2023
Included observations: 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.70E+15	1.57E+15	1.085958	0.3910
LN _{X1} ²	461311.5	515384.1	0.895083	0.4652
	-			
LN _{X1} *LN _{X3}	11292372	14402246	-0.784070	0.5151
LN _{X1}	-6.66E+10	6.54E+10	-1.017842	0.4158
LN _{X3} ²	49813152	87473971	0.569463	0.6265
LN _{X3}	1.05E+12	1.08E+12	0.970415	0.4342
				1.34E+1
R-squared	0.880447	Mean dependent var		2
				2.05E+1
Adjusted R-squared	0.581563	S.D. dependent var		2
S.E. of regression	1.33E+12	Akaike info criterion		58.77665
Sum squared resid	3.51E+24	Schwarz criterion		58.83624
Log likelihood	-229.1066	Hannan-Quinn criter.		58.37480
F-statistic	2.945784	Durbin-Watson stat		2.504306
Prob(F-statistic)	0.272626			

Continuing the research, we will create a regression model of other exogenous factors affecting the flow of tourists in the Republic of Uzbekistan.

Fisher's F-criterion is used to test the statistical significance of multifactor econometric models. Fisher's calculated F-criterion value is compared with its value in the table. If $F_{calc} > F_{table}$, then the multifactor econometric model (5) is said to be statistically significant, and its result can be used to forecast the development of tourism in the era of the digital economy for future periods.

5. CONCLUSIONS

The results indicate a very active use of digital technologies when traveling in Uzbekistan by respondents aged 17 to 44 years. On average, 67% of tourists in this age segment engaged in activities such as emailing, using social media and connecting to the Internet through their mobile devices. – The majority of respondents expressed complete satisfaction with the overall quality of transport services, standards of tourism products, quality of service and accommodation provided to them during their stay in Uzbekistan. – 83% of international tourists surveyed indicated that they felt safe while traveling in Uzbekistan, and 76% would recommend the destination to their friends. – The culture and

heritage of the Silk Road have played an important role in attracting visitors to Uzbekistan. 81% of international tourists surveyed said they were attracted to a destination by its historical connections to the Silk Road.

If the increase in the number of marriages in Uzbekistan had a negative effect on the number of tourists, it was determined that the development of the transport system had a positive effect and that an increase of 1% would lead to an increase in the number of tourists by 86.4 times. The majority of respondents (89%) noted that the people of Uzbekistan are very hospitable. – The main challenges when traveling to Uzbekistan, according to the respondents, are the standards of roads and infrastructure, tourist information.

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