THE IMPACT OF DIGITALIZATION ON THE FINANCING AND DEVELOPMENT OF THE TOURISM INDUSTRY

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Abstract. The article analyzes the impact of digitalization on the financing and development of the tourism industry, considering both global and national aspects. The aim of the study was to identify and quantify the impact of digitalization and investment trends on the development of the tourism industry in the Republic of Kazakhstan using multiple linear regression methods to identify factors contributing to sustainable tourism growth in the context of the digital transformation of the economy. The article analyzes technologies that help automate business processes, improve user experience and manage tourist flows, analyzes the volume of investments in the development of tourism infrastructure, including the digital component, with an emphasis on their impact on the modernization and growth of the industry, and examines the achievements and challenges of digitalization of tourism in Kazakhstan, including financial and infrastructural aspects. as well as recommendations for development. The results of the study indicate that the digitalization of tourism contributes to an increase in investment, an improvement in the quality of services and an increase in the competitiveness of the industry through the introduction of modern technologies and automation of processes. The main conclusions of the study emphasize the importance of investing in digitalization to improve the quality of tourism services, improve the country's accessibility and competitiveness at the international level.

Keywords: digitalization, tourism industry, financing, investments, technology, sustainable development.

Main provisions. The digitalization of tourism in Kazakhstan is a key factor in the modernization of the industry, contributing to improving the quality of tourism services, attracting investment and infrastructure development. Combining investment indicators in accommodation, food, art and entertainment makes it possible to more accurately reflect investment activity in related segments of the tourism sector in the absence of a specialized indicator. The analysis of foreign and domestic literature revealed strategic directions of digitalization of tourism: infrastructural, cultural and resource, managerial and institutional. Conclusions are drawn about the need for an integrated approach to digital transformation focused on sustainability, accessibility and integration of innovative technologies into the tourism ecosystem of Kazakhstan.

Introduction. In the context of global challenges and rapid technological progress, digitalization is becoming an integral part of the modernization of the tourism industry. Tourism, being one of the dynamically developing sectors of the economy, not only makes a significant contribution to the country's GDP, but is also a catalyst for socio-economic development. However, the effectiveness of the tourism industry largely depends on the level of implementation of digital technologies that can provide convenience for tourists, improve resource management and increase the country's competitiveness in the global market.

Given the need to attract foreign tourists, optimize infrastructure and promote the country's cultural heritage, the digitalization of tourism in Kazakhstan is becoming particularly important, with the key objective of introducing innovative technologies such as online booking platforms, virtual tours and analytical tools for managing tourist flows. An analysis of the dynamics of investment and digitalization allows us to identify key factors affecting the development of the industry and develop recommendations for improving its efficiency.

The research aims to identify the relationship between digitalization and tourism development, analyze the current state of the industry in Kazakhstan and develop practical recommendations for further improvement.

The hypothesis of the study is that the digitalization of the tourism industry, expressed in increased investment in digital infrastructure and technology, contributes to:

- improving the quality of travel services;
- increase in the volume of tourist flows;
- optimization of resource management;
- strengthening Kazakhstan's competitiveness in the international arena.

Literary review. In the context of rapid digital transformation and the global economy, tourism is becoming one of the most susceptible sectors to the introduction of innovative technologies. According to Yuksel, F. et.al the concept of smart tourism is based on the development of digital infrastructure, investments in IT platforms and the creation of digital services that contribute to the personalization of the tourist experience [1, pp.92-102]. Ulrike Gretzel et.al deepen this understanding by defining "smart" tourism as a modern trend of "smart" tourism, as well as laying its technological and business foundations [2]. Tulung, L.E. et.al concretizes these approaches, focusing on studying the determinants of tourist loyalty by examining the relationship between smart tourism technologies, unforgettable tourist experiences, destination image and tourist loyalty, both directly and indirectly [3]. Azis, N., Amin, M., Chan, S. & Aprilia, C. rightly note that dynamic interaction of stakeholders is necessary using a technological platform on which information related to tourism activities can be instantly exchanged [4, pp.603-625]. Feifei Tian and Gangmin Weng emphasize that digitalization is seen as a new catalyst ready to improve the global economic landscape [5].

Considering Kazakhstan's experience in the development of digitalization of tourism, D.G. Mamraeva, L.V. Tashenova, D.D. Grebenyuk pay attention to the issues of qualitative changes in the process of serving tourists in the context of digitalization, where the effective use of digital technologies that automate, accelerate and modernize these processes have a positive impact on the level of tourism development in the country [6, pp.122-131]. At the same time, Tleuberdinova A.T., Kalmenov B.T., Mikhalich T., Kulik V.B. consider digitalization as an indicator of innovative tourism development [7, pp.279-289]. The same opinion is shared by Those E.V., Nikitinsky E.S. arguing that digitalization allows technologies to bring real benefits in all sectors of the economy, improving the quality of life

of the population, as well as creating conditions for the transition of the economy to a fundamentally new trajectory [8, pp.202-210]. Thus, domestic research focuses not only on the technological side of digitalization, but also on institutional and personnel barriers. Moldagalieva A.E., Shanbai I.N. emphasize that for the development of digitalization of tourism, it is important to ensure the interaction of all stakeholders, including the government, the private sector, local communities and international partners. Coordinated efforts by all participants can contribute to creating favorable conditions for investment, infrastructure development, improving the quality of tourist services and expanding the tourist supply [9]. Barlybayeva S., Ayapbergenova A. they focus on the digital transformation of modern Kazakhstan, which is developing along an innovative path, increasingly using communication technologies during the period of globalization and the digital revolution [10, pp.147-154].

The development of digital technologies and global integration in Kazakhstan is especially important, as the country's tourism industry has significant potential. The development of digital technologies provides unique opportunities to improve the quality of tourist services, attract foreign tourists, increase investment and increase income in this area. For Kazakhstan, the most important task is the transition from fragmented digitalization to a strategically planned digital ecosystem of tourism, where the key: integration of digital solutions into national tourism development programs; synergy between private and public investments; relying on successful foreign cases adapted to local conditions.

The digitalization process faces a number of challenges, including insufficient financing of digital platforms, uneven infrastructure development in the regions, as well as a lack of professional staff capable of introducing and supporting innovations. These problems require a comprehensive approach to their solution, including active cooperation between the State, the private sector and international partners. The literature review allows us to identify several complementary areas of analysis:

- infrastructural approach – investments in IT and digital platforms;

- cultural and resource-based approach – creation of attractive digitally enhanced travel products;

- management approach – using analytics, artificial intelligence, a lot to improve efficiency;

- institutional approach – government support, human resources, legal support.

The literature review and analysis of existing data highlight the importance of developing strategic approaches to tourism digitalization, focusing on integrating modern digital technologies such as artificial intelligence, big data analytics, and the Internet of Things (IoT) to create a competitive and sustainable tourism ecosystem.

Materials and methods. The article uses data on the development of the tourism industry in Kazakhstan and the international experience of digitalization in tourism. Official reports of government agencies of the Republic of Kazakhstan (the Committee of Statistics, the Ministry of Culture and Sports of the RK), data from international organizations (UNWTO, OECD), statistical data on financing and investments in tourism, as well as digitalization, presented in the period from 2011 to 2023, were used as sources of information. The following research methods were used:

1) Analytical method - analysis of the dynamics of investments in the tourism industry of Kazakhstan, including areas for digitalization, art, entertainment and accommodation;

2) Statistical analysis: the average annual growth rate (CAGR) is calculated to assess changes in investment in tourism; a correlation analysis was carried out to identify the interrelationships between digitalization and tourism development.

3) Economic and mathematical modeling: the correlation coefficients between investment volumes and digitalization have been estimated.

The selected methods make it possible to conduct a comprehensive analysis of the impact of digitalization on the financing and development of tourism, as well as identify the main problems and prospects of the industry. The use of statistical data in combination with econometric modeling provides an objective assessment of the current state and a forecast of future changes.

Results and discussion. In the context of rapid digital transformation, the tourism industry is becoming not only a recipient of new technologies, but also an important area of government investment policy. The relationship between tourism finance and digitalization can be analyzed taking into account how modern technologies are transforming the industry (figure 1).
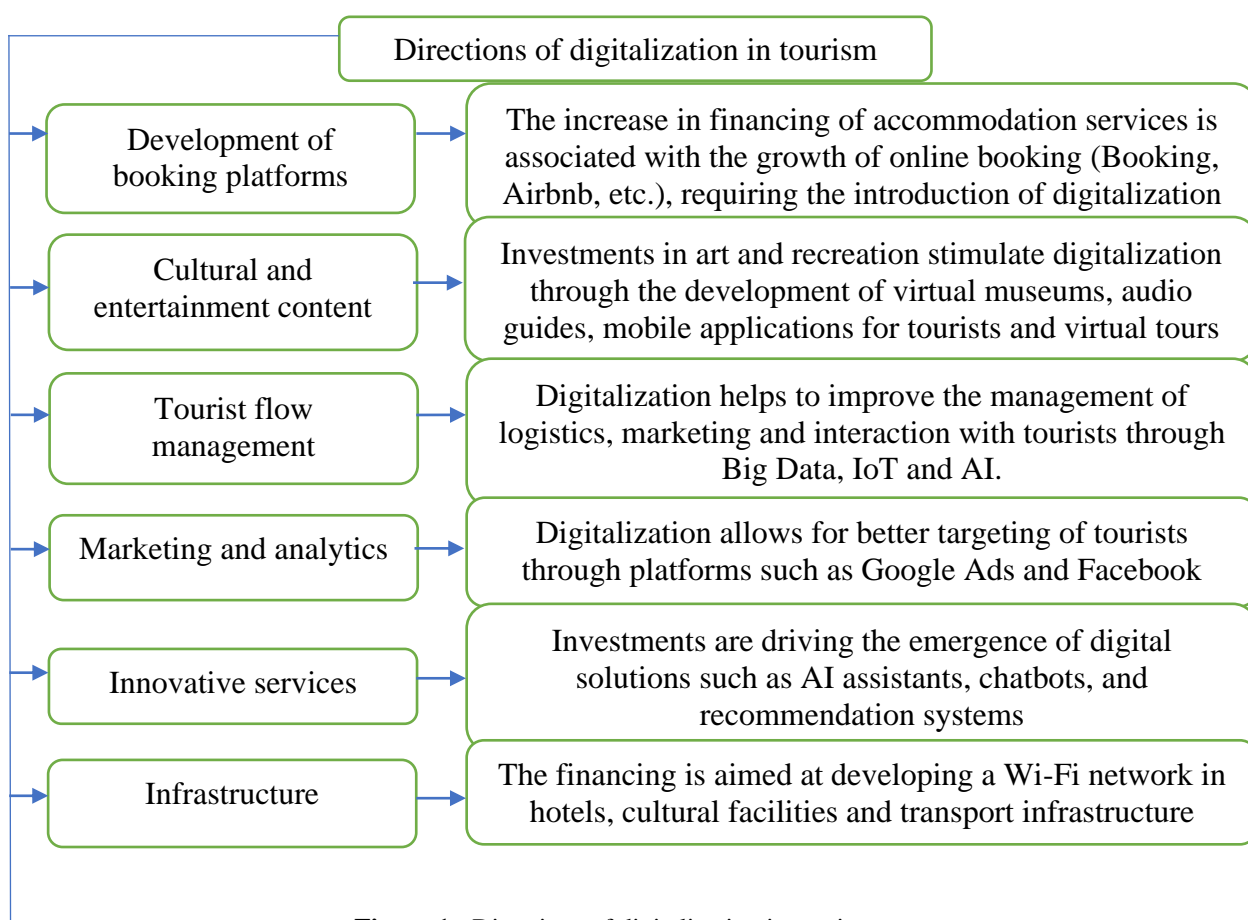
Figure 1 - Directions of digitalization in tourism

Note: compiled by the authors

Digitalization contributes to the formation of new products and services (mobile applications, booking platforms, intelligent analytics of tourist flows), requiring appropriate financing, both in IT infrastructure and related areas - accommodation, meals, cultural facilities, recreation and attractions. Such areas of financing in tourism are closely linked to digitalization, contributing to the development of new technologies that increase the efficiency and accessibility of tourism services, stimulating the growth of the sector.

Sustainable tourism development is impossible without adapting to digital trends and introducing innovative approaches.

Correlation coefficients such as can be used to analyze the relationship between tourism financing and digitalization:

1) Investments in accommodation and digitalization of booking services, which are increasingly accompanied by the introduction of digital solutions:

- Smart hotels – automation of check-in, room management through a mobile application;

- online booking, electronic tickets, digital navigation in entertainment complexes and resorts);

- the use of Big Data and Al in forecasting demand and managing tourist flows.

2) Investments in art and online entertainment:

- ARVR-museums and quest-exhibitions in cultural and art objects.

Thus, investments in these areas actually reflect investments in the digital infrastructure of tourism. Investments in physical infrastructure (hotels, restaurants, museums) are inseparable from the introduction of digital platforms, applications, and digital management systems (BMS, CRM, ERP in hotels and other facilities) (table 1) [11].

Table 1 - Innovative financing in tourism, million tenge

Year	Investments aimed at accommodation and catering services	Investments aimed at the development of art, entertainment and recreation	Investments aimed at development in the field of tourism
2011	32579	74933	107512
2012	41159	101423	142582
2013	36218	97796	134014
2014	49373	113523	162896
2015	48336	113630	161966
2016	80780	68779	149559
2017	129496	75132	204628
2018	192132	104210	296342
2019	148385	155896	304281
2020	143236	351043	494279
2021	173730	264499	438229
2022	132292	257500	389792
2023	150466	309060	459526

To analyze data on investments aimed at various aspects of tourism, we will calculate and interpret the following indicators:

1. Absolute change (Δ):

The difference in values between the years allows you to assess the growth or decline of investments in a particular category:

$$\Delta t = Yt – Yt\text{-}1, \tag{1}$$

2. Growth rate (TR):
Reflects the change in the indicator as a percentage compared to the previous year:

$$TRt = \frac{(Yt - Yt-1)}{Yt-1} * 100, \qquad (2)$$

3. Average annual growth rate (CAGR):

$$CAGR = (\frac{Y_{кон}}{Y_{нач}})^{1/n} - 1, \qquad (3)$$

Let's calculate the absolute change and growth rate of the considered indicators (table 2).

Table 2 - Investments aimed at accommodation and food services, investments aimed at the development of art, entertainment and recreation

Year	Investments aimed at accommodation and catering services, million tenge	Absolute change (Δt)	Growth rate (TRt), %	Investments aimed at the development of art, entertainment and recreation, million tenge	Absolute change (Δt)	Growth rate (TRt), %
2011	32579	-	-	74933	-	-
2012	41159	8,580	26,34	101423	26,490	35,36
2013	36218	-4,941	-12,0	97796	-3,627	-3,58
2014	49373	13,155	36,34	113523	15,727	16,08
2015	48336	-1,037	-2,10	113630	107	0,09
2016	80780	32,444	67,14	68779	-44,851	-39,47
2017	129496	48,716	60,31	75132	6,353	9,23
2018	192132	62,636	48,37	104210	29,078	38,71
2019	148385	-43,747	-22,78	155896	51,686	49,60
2020	143236	-5,149	3,47	351043	195,147	125,09
2021	173730	30,494	21,29	264499	-86,544	-24,65
2022	132292	-41,438	-23,86	257500	-6,999	-2,65
2023	150466	18,174	13,74	309060	51,560	20,02
Note: compiled by the authors on the basis of calculations performed						

For further analysis, the author proposed combining two investment indicators reflecting the infrastructural basis of the tourism industry (investments aimed at the development of art, entertainment and recreation, and investments aimed at accommodation and catering services). This need is caused by the fact that there really is no single, direct statistical indicator in the tourism sector that would fully reflect the volume of investments in fixed assets aimed at the development of tourism. This is due to the fact that tourism, by its nature, is an intersectoral phenomenon that covers several sectors of the economy at once (hospitality, food, culture, transport and recreation). This combination allows you to:
- more accurately assess the contribution of cultural and hotel infrastructure to economic development;

- simplify the econometric analysis and adequately reflect the synergetic effect of these areas;

- to obtain more stable and interpretable coefficients in the regression equation (table 3) [11].

Table 3 - Investments aimed at development in the tourism sector

Year	Investments aimed at development in the field of tourism, million tenge	Absolute change (Δt)	Growth rate (TRt), %
2011	107512	-	-
2012	142582	35070	32,61
2013	134014	-8568	-6,01
2014	162896	28882	21,56
2015	161966	-930	-0,57
2016	149559	-12407	-7,66
2017	204628	55069	36,81
2018	296342	91714	44,81
2019	304281	7939	2,68
2020	494279	189998	62,45
2021	438229	-56050	-11,34
2022	389792	-48437	-11,05
2023	459526	69734	17,89
Note: compiled by the authors on the basis of calculations performed			

Let's determine the average annual growth rate (CAGR):

1) The cost of accommodation and meals $= (\frac{(Y_{кон})}{Y_{нач}})^{1/n} - I = (\frac{(15066)}{32579})^{1/12} - 1 = 12{,}81\%$

This category shows steady growth, especially in the periods of 2016-2018. However, there are temporary declines caused by external economic factors.

2) CAGR art and entertainment $= (\frac{(Y_{кон})}{Y_{нач}})^{1/n} - I = (\frac{(309060)}{74933})^{1/12} - 1 = 10{,}34\%$

The sharp increase in 2020 is due to an increase in funding for cultural events, but the figures will stabilize in the future.

3) CAGR tourism development $= (\frac{(Y_{кон})}{Y_{нач}})^{1/n} - I = (\frac{(459526)}{107512})^{1/12} - 1 = 11{,}91\%$

The growth since 2016 indicates an increase in government attention to this area, as tourism, being one of the dynamically developing sectors of the economy, not only makes a significant contribution to the country's GDP, but is also a catalyst for socio-economic development. The sharp increase in 2020 reflects attempts to offset losses due to the pandemic. Therefore, in the context of the post-pandemic recovery of the industry, the key task is to introduce innovative technologies and analytical tools to manage tourist flows.

To carry out a correlation analysis of the indicators under consideration, we will determine the total number of investments by areas of use (figure 2) [11].
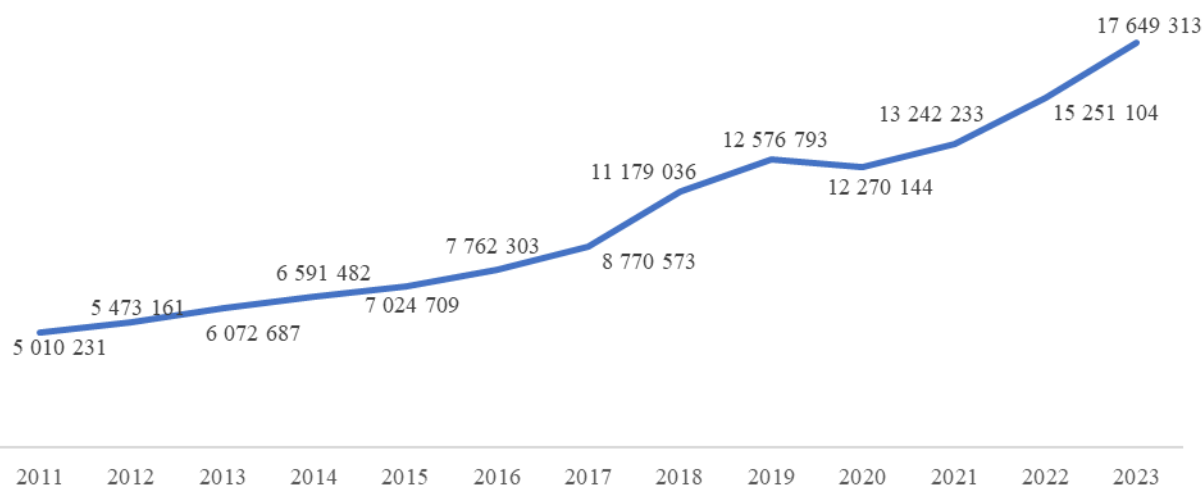
Figure 2 - Investments in fixed assets, million tenge

Let's identify the degree of connection between investments aimed at various aspects of tourism.:

- accommodation and meals - X1
- art, entertainment and recreation – X2
- the number of investments in the areas of use - У.

The Pearson correlation formula was used for the analysis:

$$r = \frac{\Sigma(X-X^-)(Y-Y^-)}{\sqrt{\Sigma(X-X^-)^2} * \Sigma (Y-Y^-)^2} \,,$$

(4)

where:

X and Y are the values of variables.

X^- and Y^- are the average values of the variables.

1. The correlation between $X1$ (accommodation and meals) and Y (number of investments in areas of use):

- average value $X1$:

$$X^-1 = \frac{\Sigma X1}{n} = \frac{32579 + \cdots + 150466}{13} = 9863123$$

- average value Y:

$$Y^- = \frac{\Sigma Y}{n} = \frac{5010231 + \cdots + 17649313}{13} = 991336685$$

After substituting into the formula and performing calculations rX1,Y = 0.92 - A high positive correlation indicates a strong relationship between investments in accommodation and food and overall investments.

2. Correlation between $X2$ (arts and entertainment) and Y (fixed asset investments):
- average value $X2$:

$$X^{-}2 = \frac{\Sigma X2}{n} = \frac{74933 + \cdots + 309060}{13} = 16155323$$

After substituting into the formula and performing calculations, rX2,Y = 0.89 is also a high positive relationship, but slightly less pronounced than for $X1$.

3. The share of $X1$ and $X2$ in the total investments is calculated as:

$$\text{Fraction (\%)} \frac{investment}{investments\ in\ fixed\ assets} * 100, \tag{5}$$

The results of the calculation of the shares are shown in figure 3.
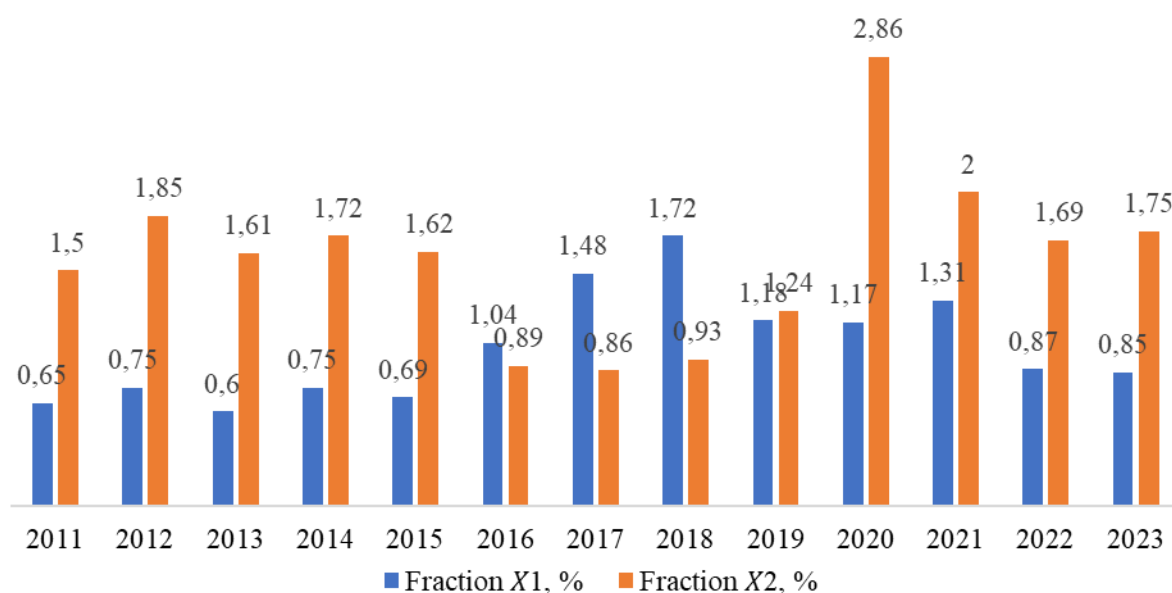
Figure 3 - Share calculation results

Note: compiled by the authors on the basis of calculations performed

Investments in accommodation and meals ($X1$) they show a stronger correlation with total investments ($r = 0,92$), than art and recreation ($X2$, $r = 0,899$).

Share of investments in accommodation and meals ($X1$) fluctuates in the range 0,6–1,7%, and the share of investments in art and recreation ($X2$) compose 0,9–2,8%.

In 2020, there is a sharp increase in the share of $X2$, which is probably due to increased investment in the development of culture and recreation in response to the COVID-19 pandemic. These results highlight the need for further improvement of government policy for the sustainable development of tourism in Kazakhstan.

To quantify the impact of various investment directions on the development of the tourism industry, in particular, on the total amount of financing associated with digital and related initiatives, it is advisable to apply the multiple linear regression method, which

allowed us to establish statistically significant relationships between the level of total investment in tourism (as a dependent variable) and key investment directions, such as investments in accommodation and catering services and facilities for art, entertainment and recreation, that is, those segments, which are being most actively transformed under the influence of digitalization. The transition to regression analysis allows not only to confirm the existence of a correlation, but also to build an explanatory model suitable for forecasting and making managerial decisions in the tourism sector, taking into account digital priorities. Let's consider an econometric model reflecting this dependence (table 4).

**Table 4** - An econometric model reflecting this relationship

№	Variable	VIF
1	const	4,245364662392456
2	X1_Investment_Hospitality	1,7694386884273823
3	X2_Investment_Art	1,7694386884273823
Note: compiled by the authors on the basis of calculations performed			

The multiple linear regression model revealed the relationship between investments in the tourism industry (Y) and two key factors – investments in accommodation and catering services (X1) and investments in art, entertainment and recreation (*X2*):

$$Y = -2,419,000 + 62,36 * X2 – 34,76 * X1 \qquad (6)$$

- the coefficient at X2 is significant at 0.01 (p=0.007), indicating a statistically reliable positive effect on the total investment volume;
- the coefficient at X1 is negative and borderline significant (p=0.089), indicating a possible inverse relationship or multicollinearity;
- the coefficient of determination (R^2 = 0.537) indicates that about 53.7% of the variance of the total investment volume is explained by the factors included;
- the VIF value indicates the presence of moderate multicollinearity between variables, requiring caution when interpreting the results.

The digitalization of tourism in Kazakhstan represents not only a challenge, but also an opportunity to create an innovative and competitive industry capable of meeting the demands of modern society, but also a strategic opportunity to create an innovative, highly efficient and competitive industry. With the systematic support and integration of digital solutions, the tourism sector can become one of the key drivers of sustainable economic growth, able to meet the demands of modern society, improve the quality of service and strengthen the international image of Kazakhstan as an attractive tourist destination (figure 4).
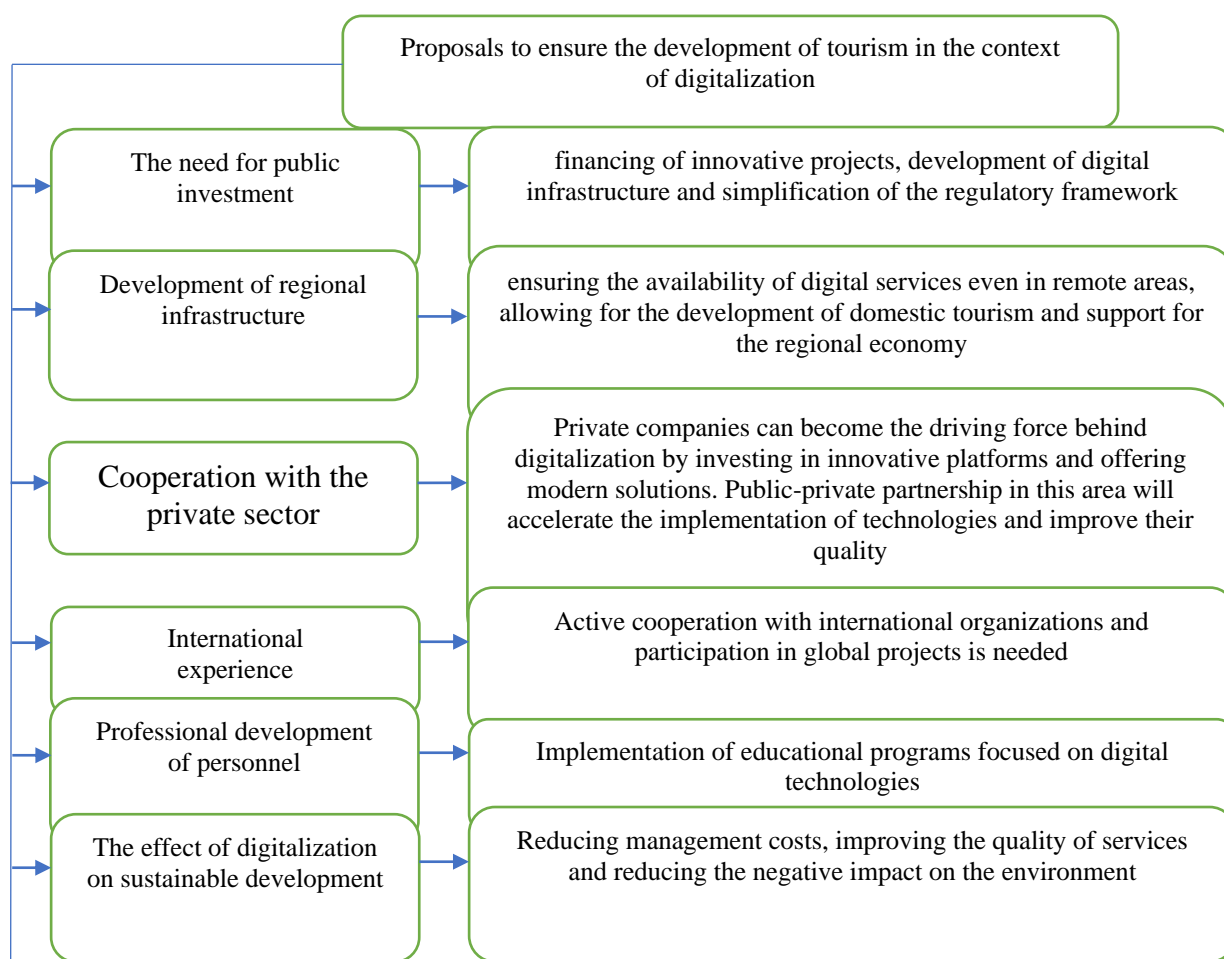
Figure 4 - Proposals to ensure the development of tourism in the context of digitalization

Note: compiled by the authors

The development of tourism in the context of digitalization requires an integrated approach covering infrastructure, financing, human resources and strategic planning. The introduction of digital platforms, the support of IT solutions in the tourism business, the expansion of Internet access in tourist regions, as well as the development of digital literacy among industry participants are becoming key areas. The implementation of the proposed measures will contribute to increasing the competitiveness of Kazakhstan's tourism industry, its integration into the global digital space and sustainable economic growth by expanding tourist flows and improving the quality of services provided.

Conclusion. Solving existing problems and implementing the proposed measures will ensure not only the growth of the tourist flow, but also the development of the economy as a whole. Digitalization of tourism and related financing are the most important drivers for the development of the tourism industry, contributing to the modernization of infrastructure, improving the quality of services and increasing international attractiveness. The dynamics of investments in tourism infrastructure, including the digital component, shows their growth in recent years, so digitalization, supported by adequate financing, is not only a tool for improving the quality of services, but also an important factor increasing Kazakhstan's competitiveness in the global tourism market.

The lack of digital literacy, limited connectivity of regions and outdated IT infrastructures are an important condition for increasing the tourist flow and integrating Kazakhstan into the global tourism ecosystem. Digitalization, supported by adequate financing, not only improves the quality of tourism services, but also contributes to economic growth by creating new jobs, stimulating the development of related sectors (transport, trade, creative industry) and strengthening the country's brand at the international level.

Thus, digitalization and financing are key drivers of the competitiveness of Kazakhstan's tourism industry, ensuring sustainable development in the face of global changes and growing international competition.

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ЦИФРЛАНДЫРУДЫҢ ТУРИСТІК САЛАНЫ ҚАРЖЫЛАНДЫРУҒА ЖӘНЕ ДАМЫТУҒА ӘСЕРІ

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Түйін. Мақала жаһандық және Ұлттық аспектілерді қарастыра отырып, цифрландырудың туристік саланы қаржыландыруға және дамытуға әсерін талдауға арналған. Зерттеудің мақсаты экономиканың цифрлық трансформациясы жағдайында туризмнің тұрақты өсуіне ықпал ететін факторларды анықтау үшін бірнеше сызықтық регрессия әдістерін пайдалана отырып, цифрландыру мен инвестициялар бағыттарының ҚР-дағы туристік саланы дамытуға әсерін анықтау және сандық бағалау болды. Мақалада бизнес-процестерді автоматтандыруға, пайдаланушы тәжірибесін жақсартуға және туристік ағындарды басқаруға ықпал ететін технологиялар талданды, саланы жаңғырту мен өсіруге олардың ықпалына баса назар аудара отырып, Цифрлық құрамдас бөлікті қоса алғанда, туристік инфрақұрылымды дамытуға инвестициялар көлеміне талдау жүргізілді, сондай-ақ қаржылық және инфрақұрылымдық аспектілерді қоса алғанда,Қазақстандағы туризмді цифрландырудың жетістіктері мен сын-тегеуріндері қаралды, сондай-ақ даму бойынша ұсыныстар. Зерттеу нәтижелері туризмді цифрландыру инвестициялар көлемін ұлғайтуға, қызмет көрсету сапасын жақсартуға және заманауи технологияларды енгізу және процестерді автоматтандыру есебінен саланың бәсекеге қабілеттілігін арттыруға ықпал ететінін көрсетеді. Зерттеудің негізгі қорытындылары туристік қызметтердің сапасын арттыру, елдің халықаралық деңгейде қолжетімділігі мен бәсекеге қабілеттілігін жақсарту үшін цифрландыруға инвестициялардың маңыздылығын көрсетеді.

Түйінді сөздер: цифрландыру, туристік сала, қаржыландыру, инвестициялар, технологиялар, тұрақты даму.

ВЛИЯНИЕ ЦИФРОВИЗАЦИИ НА ФИНАНСИРОВАНИЕ И РАЗВИТИЕ ТУРИСТИЧЕСКОЙ ОТРАСЛИ

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Резюме. *Статья посвящена анализу влияния цифровизации на финансирование и развитие туристической отрасли, рассматривая как глобальные, так и национальные аспекты. Целью исследования было определить и количественно оценить влияние цифровизации и направлений инвестиций на развитие туристической отрасли в РК с использованием методов множественной линейной регрессии для выявления факторов, способствующих устойчивому росту туризма в условиях цифровой трансформации экономики. В статье проанализированы технологии, способствующие автоматизации бизнес-процессов, улучшению пользовательского опыта и управлению туристическими потоками, проведен анализ объемов инвестиций в развитие туристической инфраструктуры, включая цифровую составляющую, с акцентом на их влияние на модернизацию и рост отрасли, а также рассмотрены достижения и вызовы цифровизации туризма в Казахстане, включая финансовые и инфраструктурные аспекты, а также рекомендации по развитию. Результаты исследования свидетельствуют о том, что цифровизация туризма способствует увеличению объёмов инвестиций, улучшению качества услуг и повышению конкурентоспособности отрасли за счёт внедрения современных технологий и автоматизации процессов. Основные выводы исследования подчеркивают важность инвестиций в цифровизацию для повышения качества туристических услуг, улучшения доступности и конкурентоспособности страны на международном уровне.*

Ключевые слова: *цифровизация, туристическая отрасль, финансирование, инвестиции, технологии, устойчивое развитие.*

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