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## THE IMPACT OF DIGITAL TECHNOLOGIES ON COMMUNITY-BASED TOURISM: CHALLENGES AND PROSPECTS IN THE GLOBAL TOURISM MARKET

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**The impact of digital technologies on community-based tourism: challenges and prospects in the global tourism market**

**Abstract.** The tourism industry is undergoing profound changes in the context of digital transformation. This article examines the impact of modern digital technologies on the global tourism market, the emerging challenges, and potential development prospects. Digital solutions such as online platforms, Big Data, artificial intelligence, virtual and augmented reality (AR/VR), and mobile applications are radically transforming the ways in which tourism services are organized, sold, and consumed. The research analyzes reports from international organizations, best practices from leading countries, and academic publications. The methodology includes content analysis, comparative analysis, and case study methods. The findings indicate that digitalization in the tourism sector contributes to improved customer-oriented services, optimization of operational processes, and enhanced quality of data-driven and marketing-based decision-making. The study also considers the key challenges of digital transformation, including insufficient legal regulation, digital inequality, cybersecurity issues, and a shortage of qualified personnel. The research concludes that sustainable development of the tourism market is possible through the implementation of effective digital strategies, the formation of an innovative ecosystem, and the strengthening of collaboration between the state, business, and academia. The results have both practical and theoretical value for tourism industry stakeholders, digital solution developers, and researchers.

**Key words:** community-based tourism, digital transformation, digital economy, online booking, digital inequality and cybersecurity.

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**Цифрлық технологиялардың қауымдастыққа негізделген туризмге әсері: жаһандық туристік нарықтағы мәселелер мен келешегі**

**Аңдатпа.** Туризм индустриясы цифрлық трансформация контекстінде терең өзгерістерді бастан кешуде. Бұл мақалада қазіргі заманғы цифрлық технологиялардың әлемдік туристік нарыққа әсері, туындайтын сын-қатерлер мен өлеуетті даму мүмкіндіктері қарастырылады. Онлайн платформалар, Big Data, жасанды интеллект, виртуалды және толықтырылған шындық (AR/VR) сияқты цифрлық шешімдер, сондай-ақ мобильді қосымшалар туристік қызметтерді ұйымдастыру, сату және тұтыну тәсілдерін түбегейлі өзгертеді. Зерттеуде халықаралық ұйымдардың есептері, жетекші елдердің үздік тәжірибелері, ғылыми жарияланымдар талданады. Әдіснама контент-талдауды, салыстырмалы талдауды және тақырыптық зерттеу әдістерін қамтиды. Нәтижелер туристік сектордағы цифрландыру тұтынушыға бағдарланған қызметтерді жақсартуға, операциялық процестерді оңтайландыруға және деректер мен маркетинг негізінде шешімдер қабылдау сапасын арттыруға ықпал ететінін көрсетеді. Зерттеу сонымен қатар цифрлық трансформацияның негізгі мәселелерін, соның ішінде құқықтық реттеудің жеткіліксіздігі, цифрлық теңсіздікті, киберқауіпсіздік мәселелерін және білікті қызметкерлердің жетіспеушілігін қарастырады. Зерттеуде туристік нарықты тұрақты дамыту тиімді цифрлық стратегияларды іске асыру, инновациялық экожүйені қалыптастыру, мемлекет, бизнес және ғылыми топтар арасындағы ынтымақтастықты нығайту есебінен мүмкін деген қорытынды жасалады. Нәтижелердің туристік саланың мүдделі тараптары, цифрлық шешімдерді әзірлеушілер мен зерттеушілер үшін практикалық және теориялық мәнге ие.

**Түйін сөздер:** қоғамдық туризм, цифрлық трансформация, цифрлық экономика, онлайн-брондау, саңдық теңсіздік және киберқауіпсіздік.

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**Влияние цифровых технологий на туризм, основанный на сообществах: вызовы и перспективы на глобальном туристском рынке**

**Аннотация.** Индустрия туризма претерпевает глубокие изменения в условиях цифровой трансформации. В статье рассматривается влияние современных цифровых технологий на мировой рынок туризма, возникающие вызовы и потенциальные перспективы развития. Цифровые решения, такие как онлайн-платформы, большие данные, искусственный интеллект, виртуальная и дополненная реальность (AR/VR) и мобильные приложения, радикально меняют способы организации, продажи и потребления туристских услуг. В исследовании анализируются отчеты международных организаций, передовой опыт ведущих стран и научные публикации. Методология исследования включает контент-анализ, сравнительный анализ и методы анализа кейсов. Результаты свидетельствуют о том, что цифровизация в сфере туризма способствует улучшению клиентоориентированного сервиса, оптимизации операционных процессов и повышению качества принятия решений на основе данных и маркетинговых решений. В исследовании также рассматриваются ключевые проблемы цифровой трансформации, включая недостаточное правовое регулирование, цифровое неравенство, проблемы кибербезопасности и дефицит квалифицированных кадров. В исследовании сделан вывод о том, что устойчивое развитие туристского рынка возможно благодаря реализации эффективных цифровых стратегий, формированию инновационной экосистемы и укреплению взаимодействия государства, бизнеса и академических кругов. Результаты имеют как практическую, так и теоретическую ценность для заинтересованных сторон туристической отрасли, разработчиков цифровых решений и исследователей.

**Ключевые слова:** общественный туризм, цифровая трансформация, цифровая экономика, онлайн-бронирование, цифровое неравенство и кибербезопасность.

**Introduction.** In the modern digital age, the tourism industry is entering a new stage of development. The intensive development of digital technologies has led to dramatic changes in such important areas as the provision of tourism services, interaction with consumers, and marketing strategies. This process covered all segments of tourism and became an alternative to traditional approaches in the industry. As noted by A.V. Alyamkina and her colleagues, “online booking systems will displace traditional agencies in the tourism industry and provide a flexible response to consumer choice” [1, p.15]. Community based tourism (CBT) does not stay away from this trend and opens up new opportunities. Artificial intelligence can help local communities establish effective connections with tourists, improve the quality of services and increase tourism revenues [2].

Technologies such as artificial intelligence, Big Data, mobile applications [3], cloud computing, social media platforms and virtual reality (VR/AR) have significantly expanded the possibilities of designing, personalizing and promoting travel products [3, p. 5]. This not only improved the quality of service, but also led to a change in the structure of the tourism business, management processes and the model of interaction with the consumer [4].

The widespread adoption of digital solutions has increased competition in the tourism market in CBT and taken consumer demands to the next level. In this regard, the need to introduce innovative technologies in the tourism industry is increasing.

**The purpose of the study** is a comprehensive analysis of the impact of digital transformation on the tourism sector. **The main objectives of the study** are:

- determining the place of digital technologies in the CBT tourism system;
- examination of successful foreign practices;
- forecasting future trends in Kazakhstan.

This study also takes into account the difficulties associated with digital transformation: factors such as insufficient regulatory framework, infrastructure restrictions, shortage of specialists and digital inequality [5, 6]. Such an integrated approach will make it possible to propose effective strategies that contribute to the sustainable and inclusive development of the tourism industry.

**Materials and methods.** This study is based on a qualitative methodology and is aimed at a comprehensive assessment of the impact of digital transformation in the tourism sector. The research used scientific methods such as content analysis, benchmarking, situational investigation, and peer review.

The content analysis method systematized the structure and content of scientific works and official sources related to the topic, determined the main concepts, trends and concepts. The comparative analysis method made it possible to consider the experience of foreign countries in the development of digital tourism and compare them with the situation in Kazakhstan. This approach involved identifying effective international models and aligning them with local features.

Reports of international organizations (UNWTO, OECD, WTTC, etc.), scientific articles characterizing the experience of leading countries, as well as the work of domestic researchers were used as material. The sources are considered in the theoretical and

applied direction, a comprehensive analysis of their content is carried out. Each source of information was assessed in terms of authorial views and their relationship to the research topic was determined.

All data were divided into thematic blocks and included the following aspects of digital transformation: online booking and OTA platforms, Big Data [3] and analytics tools, mobile applications and AR/VR technologies [6], digital marketing [7] and client practice management. This framework

contributed to the generation of reliable and up-to-date data in accordance with the objectives of the study.

The difficulties and limitations of digital transformation were also taken into account. These studies were analyzed by the interpretation method and interpreted in conjunction with theoretical grounds. This approach made it possible to comprehensively characterize the impact of digital technologies on the tourism industry and develop specific proposals.

Table 1 – The impact of digital technologies on tourism and community-based tourism (CBT): effects, challenges, and prospects [8-14]

The main effects of digital technology	Difficulties and dangers
<ol style="list-style-type: none"> <li>1. Distribution and implementation (OTA, metaplatforms) <ul style="list-style-type: none"> <li>• OTA (Online Travel Agencies) and meta-search engines (Skyscanner, Google Travel, Kayak, Trip.com) centralized distribution in tourism. This will make it easier for enterprises working with a sub-operator to enter the market, but will increase competition due to commission systems and algorithms.</li> <li>• Impact on CBT: Associations can quickly place their proposals through OTAs, however the requirements of the platform and commission affect their success.</li> </ul> </li> <li>2. Customer experience and after-sales service (mobile apps, AR/VR) <ul style="list-style-type: none"> <li>• Mobile apps, chatbots and virtual guides let you personalize the guest experience. AR/VR excursions speed up decision making by providing preliminary experience.</li> <li>• This is the potential for CBT: increase interest and enter the remote market by virtually presenting local expertise.</li> </ul> </li> <li>3. Big Data (AI) Solutions <ul style="list-style-type: none"> <li>• Travel operators carry out demand forecasting, optimization and personalization of pricing policies through data analysis. AI-based systems are used for chatbots, proposal systems, and operations automation.</li> <li>• From a CBT perspective: Data can guide development strategies by indicating which of the local services is in demand, but data collection and analysis needs to be taught.</li> </ul> </li> <li>4. Operational efficiency (automation, IoT) <ul style="list-style-type: none"> <li>• Hotel, airport and transfer services reduce costs through automated check-in, baggage control and resource management.</li> <li>• Local small players can streamline their operations if they gain access to such technology, or the digital divide will widen.</li> </ul> </li> <li>5. Marketing and Branding (Social Media, UGC) <ul style="list-style-type: none"> <li>• Social media and user generated (UGC) content is rapidly popularising tourist destinations and services. Influencer's marketing and content strategies have become important tools.</li> <li>• Distribution of visualized stories and local works for CBT attracts new consumers, but there is a risk of cultural preservation and commercialization, which is devalued.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Legal and regulatory issues <ul style="list-style-type: none"> <li>• Data protection (such as GDPR) and competitive regulation of platforms are key issues facing states. The dominant position of platforms in the market creates risks for small businesses.</li> <li>• New types of services in tourism need to be regulated (e.g. virtual tours, data-driven pricing policies).</li> </ul> </li> <li>2. Digital inequality <ul style="list-style-type: none"> <li>• As a result of a lack of infrastructure, Internet access, and digital skills in associations and developing countries, the benefits of technology are unevenly distributed. This can be a barrier to CBT development.</li> </ul> </li> <li>3. Cybersecurity and trust <ul style="list-style-type: none"> <li>• Payments, personal data and operating systems are under cybersecurity. A priority requirement for the tourism business was to ensure the safety and protection of personal data of guests.</li> </ul> </li> <li>4. Human resources and skills <ul style="list-style-type: none"> <li>• The introduction of digital tools requires retraining. The shortage of specialists at the local level is holding back the introduction of innovation.</li> </ul> </li> <li>5. Cultural and environmental threats <ul style="list-style-type: none"> <li>• Commercialization of local expertise can damage cultural integrity and the environment. Virtualized content using AR/VR can lead to the substitution of traditional practices.</li> </ul> </li> </ol>
Prospects	
<ol style="list-style-type: none"> <li>1. Improving national and regional digital strategies <ul style="list-style-type: none"> <li>• At the state level, it is necessary to include infrastructure, data security and training aspects in tourism digitalization strategies.</li> <li>• The priority should be to increase internet accessibility and digital literacy, especially in CBT development regions.</li> </ul> </li> <li>2. Innovative ecosystems and multi-stakeholder partnerships <ul style="list-style-type: none"> <li>• Partnerships between government, business and academia increase innovation. Incubators and accelerators help adapt technology through the support of local startups.</li> </ul> </li> <li>3. Mechanisms of openness and fair distribution of data <ul style="list-style-type: none"> <li>• Data sharing between platforms and local services should be governed by fair rules. Profits using data should be spread across local communities.</li> </ul> </li> <li>4. Safety and ethics <ul style="list-style-type: none"> <li>• Cybersecurity standards and consumer privacy measures should be implemented. Ethical recommendations for the preservation of cultural heritage and everyday values are also needed.</li> </ul> </li> <li>5. Kapasitu promotion and education <ul style="list-style-type: none"> <li>• Increasing the digital skills of local entrepreneurs and workers through training programs (league, practical) - a high priority</li> </ul> </li> </ol>	

**Results.** The results of the study prove that the ongoing digital transformation in the tourism industry is systemic and multi-level. This process leads to a qualitative modernization of the production, management and consumer structures of the industry.

First, online booking systems and OTA (Online Travel Agencies) platforms have significantly

changed the traditional format of tourist services, giving impetus to the development of consumer-oriented services (Table 2). At the global level, in 2024, about 70 % of tourist products are sold through online channels, and the share of OTA reached 55 % (2019 – 39 %, 2023 – 54 %) [15, 16]. This trend confirms the transition of the tourism industry to the digital ecosystem.

Table 2 - Relationship between OTA share and operational efficiency [17, 18].

Year	% OTA	Increase in operational efficiency (%)
2019	39 %	10 %
2020	44 %	15 %
2021	48 %	20 %
2022	51 %	26 %
2023	54 %	31 %
2024	55 %	35 %

Secondly, Big Data [4] and artificial intelligence (AI) technologies are becoming a decisive tool in market analysis and forecasting consumer actions. According to the data, in companies that have implemented these technologies, operational efficiency has grown to 30-35

%, and the level of consumer satisfaction has grown to 15-30 % [15, 19]. Big Data allows you to analyze, predict and adjust the strategy based on actual data (Figure 1). In addition, dynamic pricing systems created using AI can increase profitability.

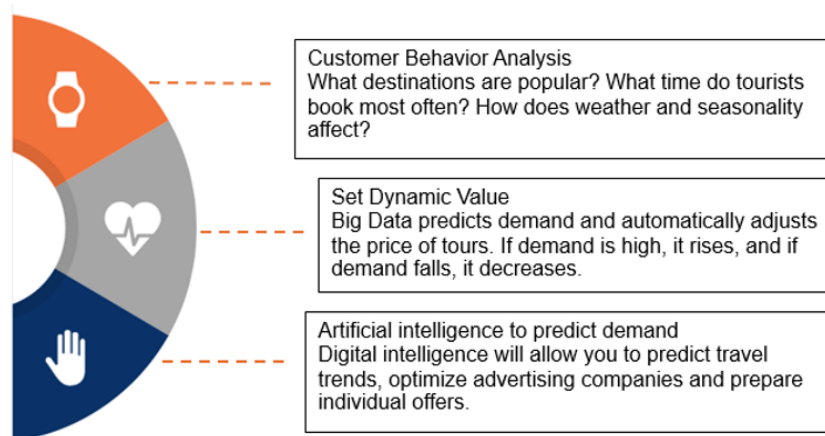


Figure 1 - Big Data - Supply and Demand Management [3]

Thirdly, the possibilities of digital marketing have significantly expanded. Targeted advertising, direct communication via social networks, visual and emotional impact of content have increased the speed

of travel products entering the market by 2.5 times over the past five years [20]. This made it possible to automate marketing strategies and evaluate the effectiveness of advertising in real time.

Fourth, digital transformation has a dramatic impact on personnel policy. According to the latest research, 82 % of employers place digital skills as a mandatory professional requirement

for tourism workers [15] (Figure 2). This requires universities and centers of advanced training to introduce digital disciplines and practical modules into curricula.

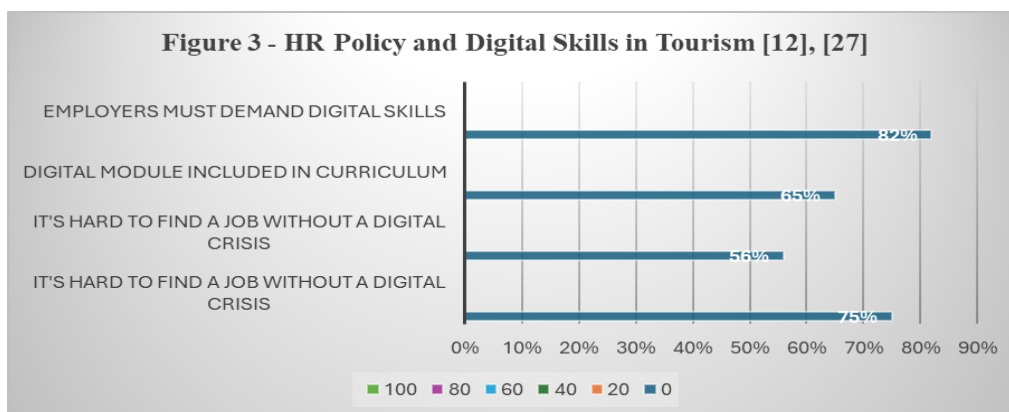


Figure 2 - HR Policy and Digital Skills in Tourism [16, 21]

Fifth, inclusive tourism is rising to a new quality level thanks to digital solutions [22]. The number of adapted travel products for people with disabilities has increased by 40 % over the past three years [23]. AR/VR technologies [15], affordable mobile applications and adapted platforms strengthen social equality in tourism.

Overall, the results of the study show that digital technology is leading to a transformation of the Community-based tourism industry, not only technological but also economic, social and cultural. This clearly testifies to the transition of the tourism industry to a new paradigm - an innovative, flexible and personalized digital model.

**Discussion.** Digital transformation is having a profound impact on all sectors of the tourism industry and accelerating the transition from traditional business models to digital ecosystems. These changes necessitated a fundamental revision of the structure of the entire industry, management models and ways of interacting with consumers and taking it to a new qualitative stage.

The global online tourism market [15] is expected to reach USD 566.7 billion in 2024 and grow to USD 1.37 trillion by 2033, representing 9.85 % of the average annual growth (CAGR) [16]. The mobile booking segment is expected to increase from \$228 billion in 2024 to \$526 billion in 2032 [17]. These indicators indicate that the tourism sector will switch to a full-fledged digital format in the future.

Online booking systems, especially OTA (Online Travel Agencies) platforms, occupy 55 %

of the market share, of which Booking.com [17]. Owns 69.3 %, Expedia Group - 11.5 % [3]. Such systems provide tourists with a high level of customer experience not only by saving time and costs, but also by personalizing offers [16].

The infographic below (Figure 1) shows the projected dynamics of the global OTA (online travel agencies) and mobile booking markets from 2024 to 2032. Indicators show a steady growth in market volume and an increase in consumer confidence and demand for digital platforms [18]. If in 2024 the volume of the OTA market will be about \$566.7 billion, then by 2032 it is expected to grow to \$1.16 trillion. The mobile booking segment is also developing at a significant pace: it is projected from \$228 billion in 2024 to \$602 billion in 2032 [7]. These trends indicate the irreversibility of the process of transition to digital solutions in the tourism industry and the growing demand of users for fast, convenient and personalized services.

I.V. Bogomazova and her colleagues note the effectiveness of Big Data [3] and artificial intelligence technologies in modeling tourist behavior, analyzing trip goals, and providing individual recommendations [16]. AI-based solutions (e.g. Trip Planner) create offerings based on the personal needs of the consumer and increase customer satisfaction [17].

AR/VR technologies [15] simplify decision-making by providing preliminary visual experience about tourist destinations. In 2024, the share of travel companies using AR/VR technologies exceeded 28% [18].

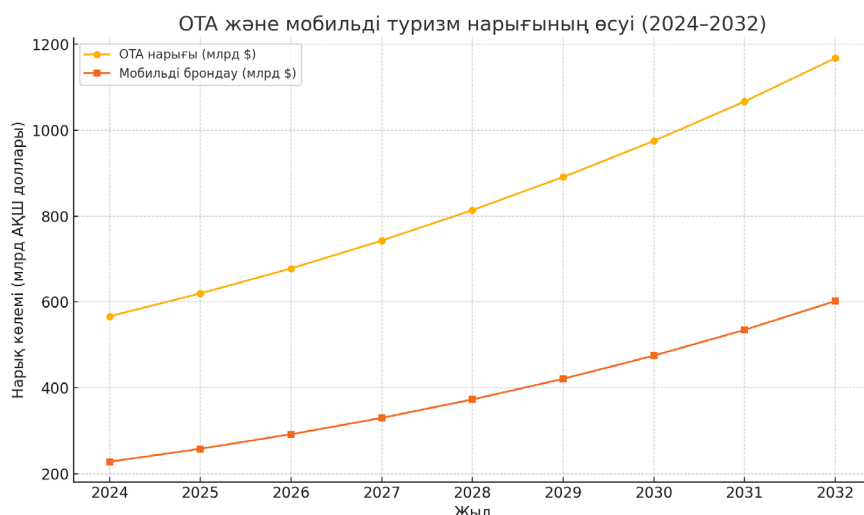


Figure 3 - OTA and Mobile Booking Market  
Projected growth between 2024 and 2032 [7]

Below are the main global indicators regarding the economic effect of digital technologies in the CBT tourism industry. This data proves by concrete figures that digital solutions directly affect the

market size, consumer experience and operational efficiency of companies. The table shows the share of different digital segments, their estimated growth and application efficiency (Table 1).

Table 3 - Economic indicators of digital tourism [19-25].

№	Index	Numeric value	Sources
1	Global Online Tourism Market Size (2024)	566,7 billion \$	IMARC Group, 2024
2	Global Online Tourism Market Size Forecast (2,033)	1,37 trillion \$	IMARC Group, 2024
3	OTA share in the total tourism market (2024)	55 %	Mize Tech, 2024
4	Share of mobile bookings in total bookings (2024)	65 %	TravelPerk, 2024
5	Revenue increase using Big Data (average%)	20-25 %	WTTC, 2023
6	Increased consumer satisfaction of companies implementing AI	15-30 %	Booking AI Insights, 2024
7	Growth of booking solutions in travel companies implemented by AR/VR	40 %	UNWTO, 2023
8	Share of travel companies covered by digital transformation (OECD)	70 %	OECD Digital Economy Report, 2023

Digital transformation gives a significant economic impetus to the development of the tourism industry. The table above shows the financial and quality indicators of the main digital segments of the industry, based on data from international expert organizations. So, if in 2024 the volume of the global online tourism market will amount to 566.7 billion US dollars, then by 2033 this figure is projected at 1.37

trillion dollars [19]. In addition, OTA platforms [1] have become the leading channel, occupying 55% of the total market [16]. The mobile booking segment is also actively developing - it is through this channel that 65 % of all online bookings are carried out [16].

While it has been proven that the use of Big Data technologies [3] increases the profits of companies by an average of 20-25 %, services with the introduction

of artificial intelligence increase consumer satisfaction by up to 30 % [21, 22]. In addition, in companies using AR/VR technologies, the level of decision-making on booking has grown to 40 % [15].

According to the OECD, 70 % of travel companies in developed countries are actively implementing digital transformation processes [6]. These trends will be clear proof that the future of the tourism industry will be entirely digital.

E.Z. Gerchikova and E.P. Spiridonova indicate that under the influence of digital solutions, the socio-psychological portrait of consumers has changed, and now they receive complete information before the trip and consciously make a decision [26]. This requires tourism companies to provide personalized, responsive and reliable consumer-facing services.

L.A. Ozimina proves that digital marketing has become the main communication channel, displacing traditional advertising in the tourism sector [27]. Social networks, blogs, working with influencers, advertising aimed at a specific target audience - all this increases the attractiveness of companies in the market.

Personnel issues remain relevant. V.N. Aniskin, A.L. Busygina, E.V. Zamara emphasize that the professional competitiveness of tourism specialists directly depends on their digital skills [28]. Working with CRM systems, analyzing Big Data [3], conducting online communications are becoming the necessary basic abilities for a modern tourism specialist.

Analyzing the role of digital solutions in the development of inclusive tourism, A.E. Pastukhova points out the importance of AR/VR, mobile applications and adaptive web platforms in increasing the accessibility of travel for people with disabilities [23].

At the regional level, V.A. Gladilin and his colleagues clarify that digital solutions [3] play an important role in developing the infrastructure of regional tourist complexes, managing tourist flow, visual branding and increasing investment attractiveness [29]. This will make it possible to sustainably develop regional tourism.

In the hospitality industry, N.G. Ustinova and M.V. Shevchenko demonstrate the importance of establishing a high level of customer service standards through virtual registration, smart numbers, chat bots and online concierge services [30].

Strengthening OTA services requires reducing the market share of traditional agencies and adapting them to new formats. T.V. Ukhina, O.V. Shpyrnya, M.V. Koreneva believe that online platforms give consumers complete independence and make it possible to independently make all decisions [31].

According to UNWTO data, world tourism in 2024 reached 99 % of the 2019 level, and the number of international visitors amounted to 1.4 billion [15]. This shows the real impact of digital solutions on the recovery and sustainable development of global tourism.

Kazakhstan is also implementing a number of initiatives in the direction of digital tourism development: expanding the Internet infrastructure, introducing digital services, training personnel, digital promotion of regional brands and adaptation of international experience. These processes are aimed at increasing the country's tourism competitiveness.

**Conclusion.** Based on the results of the study and the analyzed scientific literature, the strategic significance of digital transformation in the tourism industry based on the Community was determined [5]. Digital technologies not only improve the quality of service, but also become the main tool for individualizing consumer experience, increasing operational efficiency and ensuring social justice in the industry.

The intensive development of OTA [1], Big Data [3], artificial intelligence (AI), AR/VR, mobile applications [15] and digital marketing [17] platforms has shaped new approaches to organizing and distributing travel services. According to the results of the study, in companies that effectively implement digital solutions, operating productivity increased to 30-35 %, the level of consumer satisfaction increased by 15-30 %. These indicators indicate the real effectiveness of digital transformation.

In addition, digital transformation has a dramatic impact on personnel policy. 82 % of employers consider digital competencies as a mandatory requirement for tourism workers [15]. This will require a revision of curricula, the introduction of digital modules and practical blocks for universities and centers for advanced training.

For the tourism industry based on the community of Kazakhstan, it is also important to adopt the digital vector of development as a strategic priority, taking into account these global trends. Within the country, systemic measures are needed to modernize the digital infrastructure, support domestic online platforms, strengthen human resources and digitalize regional tourist centers.

In conclusion, digital transformation is not a temporary trend, but a fundamental foundation that ensures the long-term and sustainable development of the tourism industry as a whole. Therefore, the comprehensive introduction and development of digital tools for the tourism sector in Kazakhstan will become a decisive factor in increasing the international competitiveness of the industry, attracting new tourist flows and developing domestic tourism.



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