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DIGITAL TECHNOLOGIES AS A TOOL FOR THE DEVELOPMENT OF SUSTAINABLE TOURISM: A CASE STUDY FOR KAJAK.MK

NATALIJA BOZDOGANOVA

Abstract. Digital technologies and digital marketing have significantly transformed the tourism industry, changing consumer behavior, improving user experience and enabling more personalized and accessible travel services. Platforms like Kajak.mk are reshaping the sector by offering personalized travel planning, integrating user reviews and promoting sustainable choices. The aim of this paper is to explore the role of digital technologies as a tool for the development of sustainable tourism, with a special focus on the Kajak.mk platform and its impact on local tourism in North Macedonia. The methodology includes website analysis, a questionnaire survey, and a comparative analysis between Kajak.mk and leading global platforms, with the aim of identifying differences in technological development, functionality and user engagement. This enables the identification of potential areas for improvement and future development.

1. Introduction

With the continuous development of technology, the digital age has brought a series of new trends to marketing, which have profoundly changed the interaction between enterprises and consumers and the market competition pattern [1]. In today's technology - driven era, the most effective way to influence potential consumers is through digital social environments, where information is easily accessible. For the marketing world, analyzing target consumers, their interests and their awareness of innovative products represent a major challenge. At the same time, a significant focus of digital marketing activities is directed toward data management and protection, to which companies must respond adequately so that users feel safe when browsing digital platforms. [1] Digital marketing has become an integral component of tourism, revolutionizing how destinations attract and engage with potential visitors [2]. The rapid digitalization of tourism industry has significantly changed how travelers engage with online travel platforms, making user experience a crucial determinant of success for travel applications [3]. This transformation is closely linked to the growth of e-commerce in tourism, which enables travelers to search, compare, book and purchase services online: at home, at work or on the go. Social media platforms, including Facebook, Instagram and X (Twitter), enable travelers to share content, engage with users and create brand awareness on a global scale. These platforms not only facilitate the dissemination of information but also encourage tourists to interact with one another, share experiences and recommend destinations, thereby fostering trust and influencing decisions. The growing adoption of AI-driven personalization has also led to the use of automated travel assistants, customer service bots and predictive analytics [4]. The progress of digital technology has caused companies, individuals, businesses and systems to become intricately connected, necessitating the handling of rapidly increasing data. This has in turn made it difficult to verify quality, authenticity and eligibility of all factors. According to data from the World Tourism Organization, the size of the global tourism market is constantly expanding, and tourism economy is showing an upward trend. With 1.4 billion international tourist arrivals recorded globally, 2024 marked the recovery of international tourism from the worst crisis in the sector's history [5]. According to the latest edition of the World Tourism Barometer [6], over 1.1 billion tourists travelled internationally between January and September 2025, about 50 million more than in the

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same period of 2024. In this context, the promotion of sustainable tourism emerges as a critical success factor for the territory and the environment. Mobile technology has considerable utility in tourism since tourists are on the move in unfamiliar environments and seek information to resolve practical travel problems and to enrich the tourist experience [7]. That's why modern consumers place greater emphasis on personalization, autonomy and convenience in their travel decision-making process. They are no longer satisfied with the fixed routes and packages provided by traditional travel agencies but hope to customize their travel itineraries according to their interests, time and budget [8]. The growing emphasis on sustainability and eco-friendly travel has led to the development of e-tourism platforms that promote responsible travel choices and environmentally conscious options [9]. The integration of Industry 4.0 technologies - namely, AI, IoT and big data analytics - has further revolutionized all sectors of the economy including tourism and hospitality value chain. These technologies have transformed platforms into drivers of personalization, operational efficiency and guest satisfaction. The introduction of new participants, such as analytics providers and energy management systems, has led to the diversification of the ecosystem and the fostering of innovation. This phenomenon aligns with the tenets of platform theory, which underscores the pivotal role of digital platforms in reconfiguring economic interactions and facilitating collaborative business models among small and medium-sized enterprises. These advancements enable businesses to optimize pricing strategies; streamline booking systems and improve customer experiences [10]. The paper consists of three parts. The first part presents the theoretical framework for the importance of digital technologies in the promotion of sustainable tourism. The second part outlines the research methodology, including the analysis of a questionnaire survey and a comparative analysis of selected global platforms. It further presents the results derived from the survey conducted and ethical considerations relevant to e-tourism and Kajak.mk platform. The third part provides concluding observations, summarizing the key findings of the paper and offering recommendations for improving the implementation of kajak.mk platform.

2. Theoretical framework

Digitalization has transformed the tourism industry by augmenting business processes and improving user experience. It affects marketing, customer relationship management, operational processes and strategic planning [11]. Scientific research shows that digitalization can contribute to all three pillars of sustainability by improving tourist services (economic), reducing environmental impact (environmental) and enhancing inclusivity and planning (social) [12]. The intersection of digitalization and sustainability is reshaping the tourism industry, with digital platforms playing a transformative role in optimizing travel experiences while simultaneously influencing economic inclusivity, labor dynamics and environmental responsibility. In this regard, the field of sustainable tourism research is characterized by its broad scope and diverse range of perspectives, reflecting its inherent complexity and multidimensionality. From a macro perspective, studies investigate the interplay between tourism and sustainability, examining issues such as the role of tourism in advancing social sustainability during the pandemic, the impact of sustainable development goals on tourism performance and the connections between tourism and climate sustainability. At the meso level, research explores the relationships between sustainable tourism and various sectors, including its links to cultural heritage preservation, urbanization, rural development, green consumption and environmental governance. At the micro-level, studies emphasize individuals and organizations, underscoring how travelers' attitudes and residents' participation influence sustainable tourism. These studies also highlight the benefits for stakeholders' quality of life and organizational growth, including enhanced innovation and competitiveness [10]. The Technology-Destination Interaction (TDI) framework introduced by Jia et al. (2023) offers an extensive perspective for analyzing the dynamic relationship among

technologies, travelers, tourism activities and destinations throughout the three phases of travel consumption: pre-travel, during-travel and post-travel. This approach highlights the capacity of digital technology to improve destination image and visitor experience while fostering interaction during physical visits, potentially affecting intentions to revisit. Empirical research indicates that enhanced tourist interaction favorably influences the entire visitor experience and can elevate the quality of Memorable Tourism Experiences. Social media marketing is an effective instrument for enhancing engagement, especially during the pre-trip and journey periods. Likewise, mobile applications and digital platforms promoted through social media can offer a more immersive, tailored and easy experience for heritage tourists [13]. For that reason, sustainable development must follow a holistic approach and include all aspects of life in terms of activities, from sustainable mobility and development of regions to sustainable development of leisure services [12].

2.1. Development of sustainable tourism in North Macedonia

Sustainable tourism is defined by the World Tourism Organization as *"tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities"* [14]. In addition to this, tourism platform of **Kajak.mk** perfectly meets these consumer demands. Namely, kajak.mk is a well-known platform, established [15] in 2021 for promotion of sustainable tourism in Macedonia, where everyone can earn additional income through their hobby, passion and profession. The main goal of this platform is to enable greater communication between people and to introduce domestic tourists to what we have in our country. Kajak.mk has authentic and unique stories related to individuals who have decided to develop a small business from their interesting hobby, whether it is the production of unique items or preparing homemade specialties, telling unique stories and organizing authentic experiences throughout Macedonia. Today, kajak.mk is also a movement that identifies digital nomads, adventurers and people who are constantly searching for something new and unique [16]. Like a B2C e-tourism platform, Kajak.mk offers accommodation, mountain tourism, transport, gastronomy, outdoor activities, local guides and services, team building, blog, travel ideas, pet friendly accommodation. We can say that this platform contributes to the rural revitalization of North Macedonia by promoting lesser – known destinations and empowering local businesses. Through the examination of user interactions and the analysis of their perceptions and behaviors, valuable insights can be gained into the factors that determine the success or failure of a website [17]. Rural areas constituted a mere 16% of European accommodation sales in 2019, this figure increased to 38% when bookings were made via online travel platforms [10]. The digital transformation of the hospitality industry has gained special significance in the context of global challenges and technological changes. Since 2023, digital technologies, big data and artificial intelligence have become key drivers of operational processes in tourism industry. Analysis of recent research shows that the issues of digital transformation in tourism business have been studied by scholars such as Santarsiero, who emphasize the need to adapt business models using digital technologies for smart and inclusive tourism [18]. Kajak.mk [19] has more than 1.500 accommodations [20], a colorful choice of attractions in the rural areas of North Macedonia and surrounding countries, locals that with their knowledge and expertise bring tourists closer to each destination, numerous unique stories that are successfully realized, authentic store for shopping local products online, rich gastronomic offer in North Macedonia and team building trips in our country and beyond. Analysis of the archived sitemap of Kajak.mk indicates that the platform has been active since at least 2019. The structure of the site reveals a predominance of accommodation

listings compared to other tourism services, suggesting that lodging represents the core offering of the platform [21]. In line with technological developments, we can say that the platform Kajak.mk is an authentic place that spreads Macedonian culture and tradition in the online space. According to the data presented for this platform, we can notice that it is necessary to constantly and actively upgrade this platform and promote more local products that make our country specific and unique place to visit. Kajak.mk reveals a platform designed with clear understanding of its local mission and audience. The homepage immediately communicates the brands' identity through consistent visual theming where "nature atmosphere" is present throughout the interface, creating an immersive experience that aligns with platforms focusing on adventure and local tourism. This visual consistency strengthens brand recognition and emotional connection with users. The reservation process presents required information clearly and without unnecessary complexity, where users can easily identify, what information is needed to complete their booking process.

3. **Methodology**

In this paper, a questionnaire survey, a website analysis and a comparative analysis were used. The questionnaire survey was used to examine users' opinions, attitudes and awareness regarding the Kajak.mk platform, while the website analysis and comparative analysis were used to examine differences and similarities in technological features, user interface design and sustainability-related functionalities between Kajak.mk and leading global tourism platforms. The questionnaire was developed with the aim of collecting knowledge and perceptions regarding the digital platform Kajak.mk, its level of recognition or lack of familiarity among users and the digital benefits it offers in the field of sustainable tourism. Additionally, the global platforms selected for comparison include Booking.com, Airbnb, Expedia and Kayak.com, chosen due to their widespread use, advanced technological features and integration of sustainability-related functionalities. These platforms represent leading examples of digital transformation in the tourism industry, particularly in terms of user interface optimization, personalization capabilities and mobile-first design approaches. Furthermore, they provide a relevant benchmark for analyzing how data-driven solutions and innovative digital tools enhance user experience, service efficiency and overall competitiveness in the global e-tourism market. The analysis considered data privacy and ethical considerations as integral components of technological and user experience evaluation. This included the review of privacy policies, encryption protocols, secure payment handling and compliance with international data protection standards. By combining primary and secondary data, this paper provides a comprehensive evaluation of Kajak.mk's functionalities and ethical practices in relation to those of leading international platforms.

3.1 **Analysis of the questionnaire survey for Kajak.mk**

Based on the analysis of a questionnaire completed by 30 respondents, the results point to a relatively balanced but not fully dominant role of digital booking platforms in the decision-making process of users in North Macedonia. On the question ***"Do you use the Kajak.mk platform for booking accommodation?",*** **16,7%** use the platform **regularly, 10%** stated that they use it **occasionally** and **53.3%** use it **rarely.** These findings suggest

that although the Kajak.mk platform exists within the digital tourism ecosystem, its active usage among respondents remains limited. For the question (Image 1.) "***Do you think that the Kajak.mk platform clearly highlights sustainable tourism offers?",* 10%** of the respondents stated that the platform **fully** highlights sustainable tourism offers**, 66.7% agreed** and **23.3%** stated that the platform **partially** highlights sustainable tourism offers These results indicate a generally positive perception of the Kajak.mk platform in terms of highlighting sustainable tourism offers and suggest that the platform is effective in communicating its sustainability-oriented content, although there is still potential for further improvement in its visibility and clarity. Regarding online safety, for the question *"**How safe do you feel when using the Kajak.mk platform?",* 6.7%** of the respondents reported that they **feel very safe, 56.7%** answered that they **feel safe, 33.3%** stated that they **partially feel safe** and **3.3%** of the respondents stated that they **don't feel safe at all.** These results indicate that most of the respondents have a positive perception of the safety of the Kajak.mk platform, as the majority feel safe when using it. However, a considerable share of respondents expresses only partial confidence, suggesting a need for further strengthening of trust on the platform. When asked ***"What would you change on the Kajak.mk platform?",*** respondents most frequently indicated a need for more affordable offers."

3.2. Examples from global platforms

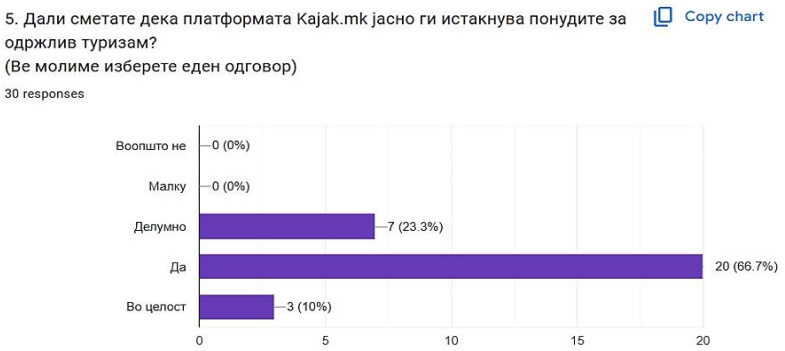

Image 1. Do you think that the Kajak.mk platform clearly highlights sustainable tourism offers?

Leading platforms such as Airbnb, Booking.com and Expedia continuously integrate advanced technological solutions - from artificial intelligence for personalized recommendations, to automated customer assistants and predictive analytics [22]. These investments result in increasingly seamless user experiences and faster booking processes. When Kajak.mk is analyzed through the lens of these modern technological standards, potential directions for platform development and enhancement can be identified. While the core functionality is solidly established - intuitive navigation, clear categorization and a transparent booking process, there are aspects where the integration of newer technological advancements could elevate the user experience to a higher level.

Following the examples of global platforms: enhancing search [17] and filtering functionality would enable users to find desired content more quickly and precisely (implementation of more advanced filters: price ranges, activity types, specific locations, availability by date); improving visual design [23] and consistency but keeping the brand spirit (continuous refinement of visual details, following current trends in digital platform design, would contribute to an even more professional impression and greater user trust) and integration of an automated customer assistant would ease the user experience and increase efficiency (following the example of Kayak.com [24] and other platforms, introducing an automated assistant - chatbot for quick responses to frequently asked questions). As tourism industry faces growing competition, destinations must utilize advanced digital tools and strategies to stand out. Effective e-marketing strategies, particularly those involving social media platforms [25], search engine optimization (SEO), content marketing and email marketing, are crucial in creating a compelling online presence that attracts both domestic and international tourists [2]. Social media significantly influences tourist behavior and decision-making through brand awareness, brand loyalty, purchase intentions and the dissemination of electronic word-of-mouth (eWoM) [2]. This development of Kajak.mk platform should be viewed as a continuous process of improvement in accordance with its own mission and resources. This platform already demonstrates that understanding the local context and authenticity can be more important competitive advantages than technological complexity. At the same time, following technological trends and adapting them to local needs represents a roadmap for sustainable development - from the current solid foundation toward an even more refined user experience that remains in step with the digital transformation of tourism. Kajak.mk could also significantly enhance its digital tourism platform by implementing an interactive smart map that integrates accommodations, attractions, activities and real-time information into a unified visual interface, thereby enabling personalized and experience-based destination exploration, facilitating informed decision-making and improving overall user engagement and travel planning efficiency.

3.3. Results

According to the privacy policy [26] of Kajak.mk, it outlines the implementation of technical and organizational measures for the protection of users' personal data, representing an important component of cybersecurity in digital tourism services. The document specifies the use of security protocols such as SSL encryption and HTTPS connections during the processing of sensitive information, particularly in online payment transactions, thereby reducing the risk of unauthorized access, data interception and misuse. Furthermore, the processing of payment transactions through certified banking systems, rather than direct storage of payment card data on the platforms servers, indicates adherence to data protection and risk management principles. Such practices demonstrate how e-tourism platforms integrate cybersecurity measures to enhance user trust, privacy protection and the overall security of online interactions. Building on this regulatory framework for data protection and cybersecurity, the survey results provide insight into

users' perceptions and actual experiences when interacting with online booking platforms, including Kajak.mk. The results from the survey indicate a generally moderate level of engagement with online booking platforms among respondents. Many respondents use these platforms occasionally, suggesting that they serve as a additional choice rather than a primary channel for booking accommodation. Regarding the Kajak.mk platform, usage remains relatively limited, as most respondents reported rare or occasional use. However, the findings show a generally positive perception of the platform, particularly in relation to its ability to clearly highlight sustainable tourism offers. In terms of online safety, most respondents reported feeling safe when using the Kajak.mk platform, although a significant percentage expressed only partial confidence, indicating that some concerns regarding privacy and data protection are still present. In addition, respondents most frequently emphasized the need for more affordable offers, suggesting a clear opportunity for improvement within the platform. This analysis of Kajak.mk also revealed that the platform has a solid foundation in core functionalities, including intuitive navigation, clear categorization and a transparent booking process. However, when compared with leading global platforms such as Booking.com, Airbnb, Expedia and Kayak.com, several areas for potential enhancement were identified. Kajak.mk's interface is clear and functional, yet global platforms demonstrate more refined visual design, interactive features and seamless integration of services. Enhancements in search and filtering capabilities, improved visual consistency and the addition of interactive tools such as smart maps could significantly elevate user engagement. Although Kajak.mk incorporates basic sustainability information, leading platforms offer more comprehensive eco-friendly options, such as green filters, carbon footprint indicators and recommendations for responsible tourism activities. Integrating similar functionalities could enhance the platform's contribution to sustainable tourism practices. Overall, this questionnaire survey, together with comparative and web analysis, highlights strengths of Kajak.mk, including its local context understanding and user-friendly design, while also identifying opportunities for technological advancement, improved user engagement and sustainable tourism integration, providing a roadmap for future development. According to Statista, the digitalization of the travel industry is strongly driven by mobile technologies and AI, which are transforming how users plan and book travel online [27]. Comparative studies of leading platforms such as Booking.com, Airbnb and Expedia show significant differences in user experience design [14], navigation efficiency and personalization features, which directly influence user satisfaction and engagement [28].The comparative findings indicate that global e-tourism platforms increasingly rely on data-driven personalization and user behavior analytics to optimize decision-making processes, while regional platforms such as Kajak.mk still operate on more static and traditional system architectures. This technological gap also influences the way platforms utilize customer feedback, where global systems systematically integrate user reviews into adaptive recommendation systems, while regional platforms primarily use them in a more descriptive and less analytical manner [19].

Question	Responses	Answers from the respondents showed in %
1. How often do you use online platforms for booking accommodation in North Macedonia	Always	6.7%
	Often	23.3%
	Sometimes	50%
	Rare	10%
	Never	10%
1. Do you use the Kajak.mk platform for booking accommodation?	Regulary	16.7%
	Occasionally	10%
	Rare	53.3%
	Never	13.3%
	Didn't heard of the platform	13.3%
2. How safe do you feel when using the Kajak.mk platform?	Very safe	6.7%
	Safe	56.7%
	Partially safe	33.3%
	Little safe	0%
	Not safe at all	3.3%
3. What would you change on the Kajak.mk platform?"	Cheaper offers	48.3%
	I think it's great the way it is	28.7%
	Nothing	23%
4. Do you think that the Kajak.mk platform clearly highlights sustainable tourism offers?	In Full	10%
	Yes	66.7%
	Partially	23.3%
	Little	0%
	None	0%

Table 1. Survey questionnaire for Kayak.mk platform

Customer reviews play a pivotal role in shaping consumer behavior, as they directly influence perceptions of trust and reliability. Positive reviews not only foster brand advocacy but also enhance customer loyalty, while negative feedback provides brands with essential insights into areas needing improvement. Effectively analyzing this feedback enables brands to address shortcomings, ultimately contributing to a more favorable consumer experience and long-term customer retention. These findings emphasize the importance of continuous technological innovation, particularly in the areas of personalization, behavioral analytics and smart interface design, as key drivers

for improving competitiveness and long-term platform sustainability. In line with these theoretical insights, the survey results also indicate (Table 1) that user feedback and perceptions are generally positive, but still highlight specific areas for improvement, particularly in relation to affordability, engagement, and trust in online booking platforms such as Kajak.mk.

4. Concluding observations

In the tourism sector, creative and innovative technology affects community welfare and business growth. The creation oof relevant and quality content is the core of every move online. The success of every digital marketing campaign depends on content and its resourceful implementation. From nature-based wellness experiences to technology-aided mindfulness practices and nostalgic destination choices, these trends offer tourists various coping mechanisms for the challenges encountered in modern travel. By understanding these evolving consumer behaviors, the tourism industry can leverage new age practices to create more holistic and adaptable experiences, ensuring a more resilient and sustainable future [29]. In this context, platforms like Kajak.mk play a crucial role in promoting sustainable tourism in North Macedonia. By aggregating diverse travel options and emphasizing eco-friendly accommodations, local experiences and responsible travel practices, Kajak.mk not only facilitates convenient travel planning but also aligns with the broader goals of sustainability, ensuring that the growth of tourism brings benefits to both travelers and the destinations they visit. Furthermore, the integration of digital technologies in tourism platforms enhances transparency, accessibility and efficiency in travel planning, enabling users to make more informed decisions. In this regard, the role of data-driven solutions and user-centered design becomes increasingly important for improving overall user experience and satisfaction. The survey results (Table 1) confirm positive perceptions, particularly regarding the platform's ability to highlight sustainable tourism, although affordability and trust remain key areas for improvement. Moreover, comparative analysis with leading global platforms demonstrates that continuous innovation in personalization, interface design and behavioral analytics significantly contributes to higher levels of user engagement and competitiveness in the digital tourism market. This highlights the importance of further technological development for regional platforms such as Kajak.mk to remain competitive in an increasingly globalized environment. Finally, future developments in e-tourism should focus on strengthening sustainability-oriented features, improving digital personalization tools and enhancing the integration of smart technologies that support both user needs and environmental responsibility. Such improvements would ensure long-term sustainability and increased value creation for both tourists and local communities.

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Natalija Bozdoganova
University of Information Science and Technology – St. Paul the Apostle,
Faculty of Information and Communication Sciences,
Ohrid, North Macedonia
natalija.bozdoganova@cns.uist.edu.mk