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DIGITALIZATION IN TOURISM - CHALLENGE AND OPPORTUNITY

Abstract: Knowledge and modern technologies play a crucial role in enhancing a country's competitiveness in the global market. As information and communications technology (ICT) has become a global phenomenon, tourism was among the earliest sectors to embrace new technologies and platforms. It was one of the first industries to digitalize its business operations worldwide. This paper focuses on digitalization in the tourism sector and analyzes the development and use of ICT infrastructure and digital services that could boost tourism and strengthen Serbia's position in the international tourism market. While digitalization offers numerous benefits, the paper also highlights key challenges—particularly the lack of digital skills, which hinders the effective use of technological advancements in tourism. Improving ICT readiness is essential, as it encourages further digitalization of travel and tourism services. According to the *Travel & Tourism Development Index Report*, Serbia continues to make strides in ICT readiness, ranking 47th out of 119 countries in 2024, with a score of 5.56.

Keywords: Digitalization, Information and Communication Technology (ICT), tourism, development, Serbia.

1. INTRODUCTION

With the transition of the economy to a new development phase—the post-industrial society—traditional factors of production, such as physical assets and manual work, increasingly cede their primacy to intangible assets that manifest in the form of knowledge and information, namely, intellectual capital. This position of knowledge is determined by its indisputable role as a carrier of technical and technological progress. For this reason, the accumulation of knowledge and investment in human capital are some of the key determinants of quality economic growth, sustainable development, and an increase in social and personal well-being (Leković, 2018, p. 40). Structural changes in the economies of highly developed countries are characterized by increased participation of technical progress as a basic development factor. Knowledge and modern technologies are key generators of growth in the competitiveness of the national economy in the international market (Đorđević, 2018, p. 15). Numerous countries are focusing on the digital economy and nurturing it as a driver of economic development (Nakatani, 2021).

As the digital economy relies on the ever-changing Internet technology, with characteristics such as industrial model innovation and inclusive growth, it will become the field with the greatest potential and fastest development in the future and will play a significant role in achieving rapid economic development (Tang, 2022). The digitalization of all areas of society is becoming an inevitability, and whether Serbia will use the digital economy as an opportunity to develop tourism and improve competitiveness in the international tourism market will depend on the speed and adequacy of its response to this challenge.

Information and communication technologies (ICT) offer significant benefits in the tourism sector, especially in tourist destinations, by influencing tourist satisfaction (Pahrudin, Hsieh, & Liu, 2023). As information and communication technology has become a global phenomenon, tourism has been a consistent early adopter of new technologies and platforms. Tourism was one of the first sectors to pioneer the shift to digital business processes globally, including online flight and hotel bookings. The digitalized tourism sector must continue to innovate and generate new business opportunities in order to ensure continued competitiveness, growth, and sustainable development of the sector (UNWTO, n.d.).

Further growth of tourism will depend on its ability to adapt to new trends in the tourism market. Technological advances and digitalization present challenges that need to be addressed, but they also offer valuable opportunities that should be seized. Digital adaptation in tourism is not an option but a necessary condition for achieving and maintaining competitiveness in the international tourism market. Sophisticated, technologically and digitally aware tourists impose new standards for the tourism industry, and the agility of companies and their readiness for change are the main prerequisites for long-term sustainable business (Tomić, Komazec, Stoiljković, & Delić, 2018).

The introduction of new technologies often raises concerns about unforeseen and unintended consequences. The latest advancements, particularly in AI, are viewed as significant risk factors that could impact the world in the coming decade. Although these technological developments must be carefully implemented to prevent negative outcomes such as job loss, privacy breaches, data security issues, or declines in service quality, they also have the potential to revolutionize the tourism industry, transforming how travelers explore destinations and interact with service providers (World Economic Forum [WEF], 2024a, p. 50).

2. THEORETICAL BACKGROUND

Business digitalization involves using digital tools, technologies, and data to enhance the efficiency and effectiveness of business processes (Miceli, Hagen, Riccardi, Sotti, & Settembre-Blundo, 2021, p. 8). The term *digitization* refers to “the action or process of digitizing; the conversion of analogue data (esp. in later use images, video, and text) into digital form” (Parviainen, Tihinen, Kääriäinen, & Teppola, 2017, p. 64). Digitalization enhances work efficiency by improving business operations through the use of digitized data and information (Kumar & Shekhar, 2020, p. 93). Some argue that *digital transformation* is a broader concept than digitization and digitalization. Digital transformation (DT) consists of three key components: technological, organizational, and social (Bikse, Lusena-Ezera, Rivza, P., & Rivza, 2021, p. 14). Digital transformation is not only about the introduction of new technology, but also about the development of people, processes, and organizations, along with the changes that arise from technology (Marx, Flynn, & Kylänen, 2021). To achieve digital transformation, it is essential to adopt a holistic approach that integrates all the previously mentioned elements—digital technologies, organizational solutions, and the human factor (Bikse et al., 2021).

Digitalization is the process through which technology and data-driven management are transforming our social and economic systems and lives (OECD, 2021, p. 11). It goes beyond converting existing processes into digital versions; it involves reimagining current operations from new perspectives enabled by digital technology (Parviainen et al., 2017). Digitalization and technological advancements are transforming people's lives, habits, work, behaviors, perceptions, and decision-making, while also creating new opportunities for travel businesses to remain competitive in the global market (Kindzule-Millere & Zeverte-Rivza, 2022). It has also transformed the traditional roles of tourism producers and consumers, introducing new roles, relationships, business models, and competencies (Dredge, Phi, Mahadevan, Meehan, & Popescu, 2018). Digitalization is affecting all businesses, and its impact will continue to grow in the future. As a result, companies need to take a proactive stance rather than waiting to see what happens or assuming that their market position will remain unchanged. Neglecting digitalization could put them at risk of falling behind in a highly competitive market (Parviainen et al., 2017).

The introduction of new technologies has also transformed systems and processes within the tourism industry (Happ & Ivancsó-Horváth, 2018). The rise of digital platforms has expanded the scope and diversity of tourism products, services, and experiences, offering on-demand features that increase transaction speed, improve market awareness, and enable faster feedback. These changes have opened up both opportunities and challenges for small and medium-sized enterprises (SMEs) in tourism as they strive to meet consumer demands and reach new markets (Dredge et al., 2018). Technological advances are creating new opportunities for SMEs to compete in markets they may not have previously accessed (Fraccastoro, Gabrielsson, & Pullins, 2021). Digital technologies and platforms offer SMEs effective and relatively low-cost ways to market, sell, and promote their products and services to global audiences, encouraging entrepreneurship in local communities (WEF, 2024a, p. 51). New IT and market trends dictate new ways of communication between businesses and target audiences, with digital marketing enabling more direct and active interaction between tourists, tourism products, and destinations (Gajić, Brdar, Stanković, & Živković, 2018, p. 207). The shift from traditional to digital media has had a significant impact, making it easier and faster for users to access

and process information (Akhtar et al., 2021). The widening reach of digital tools and systems has transformed digitalization from a driver of marginal efficiency to an enabler of far-reaching innovation and change (OECD, 2021, p. 11).

Digitalization has impacted all stakeholders in the industry. On the one hand, it has transformed the tourism experience, providing tourists with advantages such as the ability to reserve flights and trains, check in online, and book hotels through various apps, saving significant time. Tourists can also access personalized offers, take virtual tours of destinations, and easily find information on hotels, attractions, guides, and other service providers—including reviews—which helps them make informed decisions. On the other hand, digitalization has altered the operations of industry stakeholders. For example, it has led to the diversification of travel agency businesses. Digital tools have enabled more effective and efficient communication, boosting competitiveness. Additionally, digitalization has lowered information exchange costs, accelerated data transfer and retrieval, increased customer participation in decision-making, and reshaped the industry's marketing strategies. As a result, digitalization has significantly extended the reach of travel agencies (Kumar & Shekhar, 2020, p. 103).

While the importance of digitalization is widely recognized, companies often face challenges in understanding its potential impact and benefits (Parviainen et al., 2017). They may also struggle with limited technical knowledge and digital skills, inadequate ICT and digital infrastructure, and insufficient financial resources, as digitization often involves significant costs. Consequently, it is crucial for companies to understand the real opportunities and advantages that digitalization can offer, as this awareness is key to its full implementation (Kindzule-Millere & Zeverte-Rivza, 2022).

According to Parviainen et al. (2017, p. 66), the impact of digitalization and its goals for an organization can be identified from three different viewpoints:

1. **Internal efficiency** – an improved way of working via digital means and re-planning internal processes. Digitalization offers several advantages for internal efficiency, such as enhancing process efficiency, quality, and consistency by removing manual tasks and improving accuracy. It can also provide better real-time visibility into operations and results by integrating structured and unstructured data, enhancing data insight, and consolidating data from multiple sources. Additionally, it can improve employee job satisfaction by automating routine work and freeing time for skill development.
2. **External opportunities** – new business opportunities in existing business domain (e.g., new services, new customers). These opportunities include faster response times, enhanced customer service, along with the potential for innovative ways of doing business. New digital technologies can create opportunities for new services or advanced customer offerings.
3. **Disruptive change** – digitalization is completely changing business roles. Disruptive changes involve shifts in a company's operating environment caused by digitalization. For example, a company's existing business model may become obsolete in the new context (e.g., manual scanning of invoices being replaced by electronic invoicing). On the other hand, digitalization can also create entirely new business opportunities, such as the inclusion of an e-invoice operator.

It is widely believed that people are vital to the successful delivery of tourism services. Consequently, those working in tourism are considered a critical component in the effective operation of businesses in the sector (Gruescu, Nanu, & Pirvu, 2008, p. 169). Unlike other industries, the tourism and hospitality (T&H) industry relies significantly on the skills, competencies, and abilities of its human capital (Lazić, Bradić-Martinović, & Banović, 2023, p. 27). To effectively utilize digital technologies, employees must acquire new knowledge and skills (Bikse et al., 2021). The lack of digital skills has been identified as a major obstacle to leveraging the full potential of digital technologies in tourism (Dredge et al., 2018).

Lazić et al., (2023) examined the digital skill levels of employees in the T&H sector in Serbia and identified key influencing factors. The study found that, on average, T&H employees possess basic digital skills that enable them to complete simple and moderately complex tasks in a digital environment. However, the findings also indicate that the overall level of digital proficiency in the sector is insufficient to ensure long-term growth and resilience. While employees may have adequate skills for basic operations, they often lack the advanced skills necessary to implement more sophisticated digital solutions. The analysis revealed that education and job position are the most significant determinants of digital skills, emphasizing the critical role of education in workforce development.

The development of new technologies is progressing rapidly. The integration of ICT and tourism management has made acquiring appropriate digital skills essential for success in the tourism business (Lazić et al., 2023, p. 28). Ultimately, reaping the full benefits of digitalization and technological innovations will depend on each country's ability to implement policies that help workers adapt to change and acquire the necessary skills for success in the digital era (OECD, 2022, p. 5).

3. RESEARCH METHODOLOGY

More than ever, it is necessary to implement new technologies to attract tourists, so that a high-quality tourism offer can provide more than traditional ones, as modern tourists in the digital age make their travel decisions based on multiple parameters (Gajić et al., 2018, p. 208). Given that improving ICT readiness is necessary to advance the further digitalization of travel and tourism services, this paper focuses on analyzing the development and use of ICT infrastructure and digital services in Serbia.

ICT readiness is one of the pillars of the Travel and Tourism Development Index (TTDI), which is an evolution of the Travel and Tourism Competitiveness Index (TTCI) improving the index's ability to reflect the growing role of sustainability and resilience in T&T's growth, as well as the sector's role in broader economic and social development (WEF, 2021, p. 4). This paper will present and analyze Serbia's ICT readiness pillar score, along with the country's relative position (rank) compared to other economies, using data from both the TTDI and TTCI reports.

To monitor Serbia's progress in the area of ICT readiness, data will be presented for the period from 2008—when Serbia was first included in the report as an independent state—up to the most recent report from 2024. After analyzing the ICT readiness pillar over time, Serbia's scores and rank for 2024 will be presented according to the individual variables that comprise the pillar, with particular attention given to those related to the use of digital services.

4. RESEARCH RESULTS

The progress and development of the global information society have influenced every part of the economy to the extent that it is difficult to imagine any business process that does not rely on the use of information technologies (Đorđević, Vukašinović, & Veinović, 2014, p. 11). Information technologies are key drivers of the development of the tourism industry (Suyunchaliyeva, Shedenova, Kazbekov, & Akhmetkaliyeva, 2020, p. 4). Modern information and communication technologies are influencing the digitalization of the entire tourism industry. In recent years, more and more companies providing tourism services have begun to incorporate digital assets into their strategies, recognizing that change is essential for maintaining and improving competitiveness in today's market (Happ & Ivancsó-Horváth, 2018, p. 11).

The adoption of technologies such as the Internet of Things, location-based services, artificial intelligence, augmented and virtual reality, and blockchain has led to a tourism offering that is more attractive, efficient, inclusive, and economically, socially, and environmentally sustainable than its predecessor. It has also encouraged innovation and a reassessment of processes to address issues such as seasonality and overcrowding, and to develop smarter destinations (UNWTO, n.d.).

The significance of information technology in tourism—particularly in the web-based environment—has increased notably in recent years, and this trend is expected to persist. IT services have enabled business transactions within the industry by engaging with trading partners, distributing products, and providing information to customers globally (Suyunchaliyeva et al., 2020, p. 5). From AI algorithm-driven personalized trip planning to engaging virtual reality experiences, technology provides travelers with unmatched convenience and customization. At the same time, digital technology and online platforms support destinations and tourism and travel (T&T) businesses by enabling online bookings, sharing-economy utilization, digital payments, and mobile accessibility—facilitating entry into new markets, optimizing operations, improving visitor interaction, and collecting consumer insights and preferences (WEF, 2024a, p. 50).

The structure of the Travel and Tourism Development Index highlights the importance of ICT for the tourism sector, where ICT represents one of the pillars influencing the global assessment of the competitiveness and positioning of national economies as tourist destinations in the international market. The use of ICT enhances the competitiveness of a tourism destination and its stakeholders, as it helps meet the diverse and complex needs of modern tourists (Petrović, Milićević, & Djeri, 2017).

Information and Communication Technologies (ICT)—specifically, ICT Readiness (formerly known as ICT infrastructure)—is one of the pillars of the Travel and Tourism Development Index (TTDI), which evolved from the Travel and Tourism Competitiveness Index (TTCI). This pillar measures the development and use of ICT infrastructure and digital services (WEF, 2021, p. 9). Table 1 shows the score and rank of the ICT Readiness pillar for Serbia.

Table 1: Score and Rank of the ICT Pillar for Serbia

Year	Pillar	Score (1-7)	Rank
2008	ICT infrastructure	2.8	57 (out of 130)
2009	ICT infrastructure	2.9	63 (out of 133)
2011	ICT infrastructure	3.3	62 (out of 139)
2013	ICT infrastructure	3.6	49 (out of 140)
2015	ICT Readiness	4.4	56 (out of 141)
2017	ICT Readiness	4.8	57 (out of 136)
2019	ICT Readiness	5.0	56 (out of 140)
2021	ICT Readiness	5.1	53 (out of 117)
2024	ICT Readiness	5.56	47 (out of 119)

Source: Authors' presentation based on TICI and TTDI reports.

Based on the data shown in Table 1, a positive trend in the ICT pillar score for Serbia can be observed. In the initial year of the analyzed period, 2008, Serbia's score for this pillar was the lowest compared to all other years in the observed period, amounting to 2.8. In the following years, the score improved year by year, reaching a value of 5.56 out of a possible 7 in 2024, the final year of the observed period.

When it comes to Serbia's relative position on the list for the ICT pillar, after 2011 the country consistently ranked around 50th place. According to the most recent TTDI report from 2024, Serbia ranks 47th out of a total of 119 countries—a significant achievement, as a rank below 50 indicates global competitiveness.

Table 2 shows the score and rank for each individual variable that comprises the ICT readiness pillar for Serbia. Serbia's overall score for this pillar is 5.56, which is higher than the average score of 5.0. Furthermore, most of the individual variable scores are also above the average, with the exception of the variable **Power losses**, where Serbia scores slightly below average.

Table 2: Scores and Ranks of ICT Readiness Pillar Variables for Serbia, 2024

ICT READINESS	Score	Rank
Individuals using internet	6.01	54
Broadband internet subscribers	4.14	46
Mobile broadband subscribers	6.18	45
3G mobile network coverage	6.95	54
Use of digital payments	6.25	36
Use of digital platforms for providing transportation and shipping	4.93	42
Use of digital platform for providing hotels, restaurants and leisure activity services	5.38	36
Power losses	4.65	81

Source: Authors' presentation based on the Economy Profiles in the TTDI 2024 Edition.

Based on the data presented in Table 2, it is evident that Serbia has high scores in many of the variables comprising the ICT readiness pillar. The variable **3G mobile network coverage rate** has the highest score—6.95 out of a possible 7. The variable **Broadband internet subscribers** has the lowest score, 4.14. However, despite being the lowest among the ICT readiness variables, Serbia's relative position in this category is still strong, ranking 46th.

Overall, Serbia achieves a relatively high score in the ICT readiness pillar. With a score of 5.56, it exceeds the average. Serbia's position on the TTDI list is also notable, ranking 47th. Achieving above-average scores in seven out of the eight variables and demonstrating continuous growth from 2.8 in 2008 to 5.56 in 2024 reflects significant progress in the field of information and communication technologies.

Although various methodological changes occurred during the observed period—especially in the variables that make up the ICT pillar—and the data are not fully comparable over time, Serbia's progress in this area remains evident. It is particularly noteworthy that the most significant improvement since the 2021 report was in the **use of digital services**. For example, in the variable **Use of digital platforms for providing transportation and shipping**, Serbia improved by an impressive 46 places, moving from 88th in 2021 to 42nd in 2024. In addition, the scores for the variables **Use of digital payments** and **Use of digital platforms for providing hotels, restaurants, and leisure activity services** have improved significantly. These two variables now represent Serbia's highest rankings in 2024, both placing the country 36th out of 119.

5. CONCLUSION

The travel and tourism sector is one of the largest and fastest-growing economic sectors in the world. Although the trend of high growth rates in travel and tourism activities in previous years was abruptly interrupted by the COVID-19 pandemic, companies operating in this field are now faced with numerous other challenges in the global business environment. One of these challenges is technological change, which affects both individual behavior when planning and making travel decisions, and the operations of companies in the sector.

In order for these technological challenges to become opportunities for gaining and maintaining competitive advantage—rather than threats to survival in a highly competitive environment—it is necessary to recognize, understand, and address the needs of today's consumers, who are becoming increasingly sophisticated due to technological progress. Digitalization is necessary to meet the growing expectations of consumers (Happ & Ivancsó-Horváth, 2018).

Digitalization has impacted all stakeholders in the industry (Kumar & Shekhar, 2020, p. 103). With online bookings, sharing economy platforms, digital payments, and mobile access increasingly shaping travel and tourism services, digital technology and online platforms are enabling destinations and tourism businesses—including small and medium-sized enterprises—to access new markets, optimize operations, improve visitor engagement, and gather consumer insights and preferences (WEF, 2024a, p. 20). Digitalization improves organizational efficiency and creates new business opportunities (Parviainen et al., 2017). It also provides tourists with advantages such as booking flights and trains, reserving hotels through various applications, and easily accessing information about accommodations, attractions, guides, and service providers—ultimately saving time and helping them make informed decisions (Kumar & Shekhar, 2020). Digital technologies also benefit older adults who are unable to travel due to age-related limitations. Technologies such as virtual reality can engage them more effectively (Akhtar et al., 2021). Moreover, technology enables remote work while traveling and offers the possibility of new experiences through virtual tourism. This allows people to explore destinations and participate in tourism activities without the need for physical travel—especially useful for individuals with mobility challenges, financial constraints, or health issues (WEF, 2024a, p. 51).

In addition to the positive aspects and opportunities, digital transformation also presents several challenges, such as a lack of funding (as digitalization can be costly), insufficient technical knowledge and digital skills, and limited ICT and digital infrastructure (Kindzule-Millere & Zeverte-Rivza, 2022). Research findings indicate that a key issue related to digital transformation is human capital and the need for employees to acquire relevant competencies and digital skills (Bikse et al., 2021). Tourism job roles are also evolving. New positions requiring new skill sets are being created, while existing roles are transforming. Consequently, continuous improvement in employees' digital skills is essential (Hsu, 2018).

According to the TTDI Report (2024), since 2019 there have been advancements in areas such as ICT readiness—especially in developing countries—and in the business environment, contributing to the growth of digitalization and operational efficiency in the T&T industry. Analysis of the TTDI and TTCI—where ICT is one of the pillars that influence the global competitiveness and positioning of national economies as tourist destinations—reveals that Serbia is making notable progress in this area. Compared to the initial year of the analysis (2008), when the ICT infrastructure pillar score was 2.8 out of 7, Serbia received a score of 5.56 in 2024, ranking 47th out of 119 countries. It is particularly noteworthy that Serbia showed the most significant improvement in digital service usage compared to the 2021 report. The variables *Use of digital platforms for providing hotels, restaurants, and leisure activity services* and *Use of digital payments* are Serbia's highest-ranking categories, placing the country 36th among 119 countries in 2024. Serbia has demonstrated notable advancement in ICT, as evidenced by a consistent year-on-year increase in its ICT pillar score—from 2.8 in 2008 to 5.56 in 2024.

The OECD emphasizes that unlocking the full potential of the digital revolution requires not only investment in digital infrastructure but also the development of human capital through skills enhancement and innovation in business models and operations (OECD, 2019). Similarly, the WEF highlights the need for travel and tourism stakeholders in developing countries to prioritize ICT infrastructure, improve accessibility, and invest in skill-building (WEF, 2024a).

Considering the above and the findings from Lazić et al. (2023), which show that T&H employees in Serbia possess adequate digital skills for basic tasks but generally lack advanced skills—limiting the adoption of more complex digital solutions—concluding remarks can be made.

To capitalize on Serbia's progress in developing and using ICT infrastructure and digital services, and to fully benefit from digitalization, it is essential to address the critical challenge of limited advanced digital skills among employees in the tourism and hospitality sector. Moving forward, the focus should be on building the competencies and digital skills needed to fully leverage technological innovations in tourism—ultimately enhancing Serbia's competitiveness in the global tourism market.

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