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DIGITAL TECHNOLOGIES AS DRIVERS OF INCLUSIVE AND SUSTAINABLE TOURISM DEVELOPMENT

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Abstract

Contemporary challenges of sustainable development and digital transformation require new approaches to developing inclusive tourism. As digital technologies significantly shape the accessibility, participation, and quality of the tourism experience of people with disabilities, this paper examines the role of information and communication technologies in overcoming existing barriers, as well as their potential to contribute to the economic, social, and environmental sustainability of destinations. Through a theoretical framework and relevant examples, the paper analyzes how the application of ICT contributes to the sustainable transformation of inclusive tourism. It identifies the key dimensions of this process and explores the challenges and prospects of their further application in contemporary tourism development. This approach contributes to a better understanding of the role of digital technologies in creating more inclusive and sustainable tourism systems.

Key Words: *inclusion, ICT, digitalization, sustainability, tourism, transformation*

JEL classification: *L83, O33, Q56*

Introduction

In an era of rapid technological changes and growing social inequalities, the concept of sustainable development has become a central framework for understanding contemporary economic and social processes, especially in the tourism sector. Sustainable development entails the harmonization of economic growth, social equality, and environmental

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protection with the aim of meeting the needs of current generations without compromising the opportunities of future generations.

In tourism, this concept extends beyond purely economic benefits to encompass the responsible use of resources, cooperation with stakeholders, and the long-term preservation of social, economic, and environmental values (Ayuso, 2007). Sustainable tourism is therefore viewed as a continuous process of adaptation and transformation, rather than a final outcome, through which tourism systems evolve in response to environmental changes and societal needs (Higgins-Desbiolles, 2018).

The 2030 Agenda and the Sustainable Development Goals (SDGs) represent a key global framework for achieving sustainable development goals (United Nations, 2015). These goals indicate the need to develop a tourism system that will not be based solely on profit but also on social inclusion and equal opportunities for all.

In this context, inclusive tourism represents an important dimension of the sustainable transformation of the tourism sector. According to the Convention on the Rights of Persons with Disabilities (United Nations, 2006), “people with disabilities are individuals who have long-term physical, mental, intellectual or sensory impairments which, in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others“ (p. 4).

The World Health Organization (WHO) estimates that about 16% of the world’s population, approximately 1.3 billion people, lives with some form of disability (The World Health Organization, 2023), while further growth in this population is expected due to population aging and chronic health conditions (Benjamin et al., 2021). People with disabilities in the tourism sector are often marginalized and insufficiently recognized as important stakeholders, both in the role of tourists and as potential employees.

Information and communication technologies (ICT) play a key role in this sustainable and inclusive transformation. ICT is recognized as one of the most important drivers of sustainable tourism development (Benckendorff et al., 2019) because it enables significant changes from both technical and engagement perspectives, thereby improving the tourist experience (Bull, 2015). The development of technologies such as artificial intelligence (AI), robotics, the Internet of Things (IoT), blockchain

systems, and digital platforms forms the basis of the Fourth Industrial Revolution, which integrates the physical and digital world and changes the way the tourism sector functions (Gorbenko et al., 2018).

This research offers a specific perspective on an integrated approach to the analysis of digital technologies as factors that simultaneously contribute to economic sustainability, social inclusion, and enhancing the competitiveness of the tourism sector. This paper focuses on the broader social significance of the digital transformation of tourism and its impact on the accessibility of tourism services for different groups of tourists. The paper contributes to a better understanding and identification of concrete possibilities of applying digital solutions in the function of sustainable tourism development, as well as pointing out the challenges and limitations of their implementation in the modern tourism environment.

People with Disabilities (PwDs) and the 2030 Agenda for Sustainable Development

The 2030 Agenda for Sustainable Development was adopted in 2015 as a document strongly influenced by the Convention on the Rights of Persons with Disabilities (CRPD). It emphasizes the importance of human rights and sets out global development commitments, with key priorities including poverty reduction, environmental and climate protection, and the promotion of peace and improved living conditions for all. The 2030 Agenda contains 17 goals and 169 targets for action, and the terms “disability” and “persons with disabilities” appear 11 times across five goals (4, 8, 10, 11, and 17). In addition, people with disabilities are recognized as part of vulnerable groups, highlighting the barriers that hinder their full realization of rights and equal participation in society (Banks et al., 2020; Abualghaib et al., 2019; United Nations, 2015).

The Sustainable Development Goals recognize the causes of exclusion and inequality affecting people with disabilities and track their needs through various indicators, including access to health, rehabilitation, education, and employment (Tebbutt et al., 2016; United Nations, 2015; Banks et al., 2020).

Table 1 presents an overview of the Sustainable Development Goals and their connection to people with disabilities.

Table 1: *Sustainable Development Goals and their connection to people with disabilities*

Sustainable Development Goals (SDGs)	Overview of goals	SDGs and People with Disabilities
SDG 4 – Quality Education	Ensure quality education that is accessible to all and encourage lifelong learning.	Eliminate gender inequalities in education and ensure equal access to education and vocational training for the most vulnerable groups, including people with disabilities. Furthermore, improve learning conditions for all.
SDG 8 – Decent Work and Economic Growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.	Ensure decent work for young people and people with disabilities, including equal pay for work of equal value.
SDG 10 – Reduced Inequalities	Promote social, economic and political inclusion, while reducing inequality and ensuring equal opportunities through policies that strengthen equality, financial regulation and safe and well-managed migration.	Encourage inclusion in social, economic and political life, regardless of age, gender, disability or any other status.
SDG 11 – Sustainable Cities and Communities	Ensure inclusive, safe, resilient, and sustainable cities and human settlements for all.	Emphasize the development of safe, accessible and sustainable transport and access to public spaces, with particular attention to people with disabilities.
SDG 17 – Partnerships for the Goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development.	Collect accurate demographic data in each country, disaggregated by key characteristics such as income, gender, age, ethnicity, disability, and location.

Source: Author's own elaboration based on data from the United Nations Sustainable Development Goals website (<https://sdgs.un.org/goals>)

Despite efforts by states and organizations, people with disabilities continue to face barriers and inequality. Their exclusion most often results from discrimination, stigma, and negative attitudes that limit access to education and social inclusion. Limited accessibility in cities and public transport makes it difficult for people with disabilities to access education, work, leisure activities, and healthcare. The situation is further exacerbated by caregiving responsibilities for people with disabilities that are borne by family members, which largely fall on women, thus maintaining existing inequalities and financial pressures (Abualghaib et al., 2019). All these factors are interconnected –limited access to education leads to lower levels of education, which later makes it more difficult to find employment, reduces incomes, and increases the risk of poverty.

Information and Communication Technologies (ICT) in Inclusive Tourism Development

The modern era brings a wide range of opportunities in the field of information and communication technologies (ICT) that significantly contribute to social development and enhance the competitiveness of companies. Numerous studies show that technology plays an important role in supporting vulnerable groups, especially people with visual impairments and mobility impairments. The use of ICT enables easier communication, access to education, and more effective learning (Tas & Tatnall, 2008).

Information and communication technologies (ICT) include telecommunications systems, the Internet, mobile devices, and other digital tools that enable better access to information and public services. For people with disabilities, technology represents not only greater comfort but also the possibility of a more independent life and full participation in society (United Nations, 2012). ICT applications and assistive technologies such as screen readers, adapted computer systems, Braille displays, speech output systems, and communication applications significantly facilitate everyday life. These technologies support learning, employment, communication, and social interaction, thereby reducing isolation and improving quality of life. ICT plays a crucial role in education. E-learning, web resources, and digital courses enable people with disabilities to have easier access to knowledge and improve their employment opportunities. Solutions such as word prediction, text

highlighting, and adaptive computer systems are especially useful for people with reading, writing, visual, and hearing impairments.

The Convention on the Rights of Persons with Disabilities (CRPD) recognizes ICT accessibility as a fundamental right. Article 9 particularly emphasizes the right to equal access to information and communication technologies without discrimination. Accessibility implies that all people can use technology without barriers, with the possibility of choosing solutions that best meet their needs (United Nations, 2006).

Examples of Digital Solutions in Inclusive Tourism

The implementation of modern technological solutions contributes to improving inclusiveness, efficiency, and sustainability in tourism. Digital transformation, fueled by Industry 4.0 and Industry 5.0 technologies such as the Internet of Things (IoT), artificial intelligence (AI), big data, virtual reality (VR), and augmented reality (AR), creates significant opportunities for the development of inclusive tourism (Ndhlovu et al., 2024). These technologies enable the creation of personalized and interactive experiences, both in the travel planning phase and during the stay at the destination.

Artificial intelligence (AI) has a particularly significant role in improving inclusive tourism. By analyzing large data sets, it is possible to identify the needs and preferences of people with disabilities, which enables accommodation, transportation, and services to be adapted accordingly. Digital tools also contribute to the training of employees to develop awareness and empathy towards people with disabilities through interactive educational modules and augmented and virtual reality-based simulations. In addition, AI-based navigation systems can provide real-time guidance, making navigation in complex spaces such as airports easier. For example, *Google Maps Live View (AR navigation)* assists users with mobility challenges by providing augmented reality-based directions, while *Microsoft Soundscape* offers audio navigation support for blind and visually impaired users. Similarly, *Wayfindr* (UK) provides accessible navigation in public environments such as airports and metro stations. Moreover, AI-driven tourism platforms such as *Booking.com's recommendation systems* and *Expedia AI travel assistants* enhance personalization by suggesting tailored travel options based on user preferences and accessibility needs. Such solutions contribute to

removing barriers and creating a more accessible tourist environment (Kasim, 2024).

A special focus is placed on the development of robotics, including telepresence robots, social assistance robots, and rehabilitation robots. Telepresence robots enable people with limited mobility to virtually participate in cultural events and tours, thus overcoming physical and geographical barriers (Balossino et al., 2025). For example, telepresence robots such as *Double Robotics* are used in museums and cultural institutions to allow virtual participation in guided tours and events. Socially assistive robots provide support through social interaction and motivation (Feil-Seifer & Mataric, 2005), while rehabilitation robots such as the *ReWalk exoskeleton* and the *Lokomat system* contribute to improving users' functional abilities and supporting gait rehabilitation processes.

Digital transformation in tourism enables the development of a “smart travel” model. This model includes smart visas, automated border procedures, digital security systems, and modern infrastructure. These technologies encourage innovation and enable process improvement, especially in the development of the concept of smart tourist destinations (UN Tourism). Smart tourist destinations are destinations with a modern management model aimed at improving competitiveness, accessibility, and the development of inclusive tourism. Their defining characteristic is the intensive use of technology and data, which enables more accurate decision-making and enhances the tourist experience at all stages of the trip—from planning and booking to the stay itself and the sharing of post-trip experiences (Gonzales-Mora et al., 2025). The principles of smart cities are applied in both urban and rural environments, addressing the needs of both residents and tourists.

Conclusion

Modern tourism cannot develop sustainably if sustainability, inclusion, and digital technologies are viewed separately. Today, digital technologies play an important role in removing various barriers faced by people with disabilities – whether physical, informational, or social – and thus enable them to participate more actively in tourism activities, as well as in society in general.

The application of ICT solutions not only improves accessibility and the quality of stay for tourists but also contributes to broader sustainable

development goals. It helps reduce inequality, develop accessible infrastructure, and strengthen the economic potential of destinations. As a result, inclusive tourism is no longer just a narrow specialization but is becoming an important development direction for the entire tourism sector.

The connection between sustainability, inclusion, and digitalization is the foundation for creating tourism that is more accessible, equitable, and successful in the long term. An important aspect of this research is connecting the concept of digitalization with the principles of inclusivity and sustainability in tourism, which provides a broader view of the role of modern technologies in the development of the tourism sector. Unlike previous studies that primarily focus either on sustainability or accessibility, this paper integrates digital transformation, inclusive tourism, and sustainable development into a unified analytical framework. The originality of this paper lies in examining ICT not only as a technological tool but also as a mechanism for achieving social inclusion and sustainable tourism development simultaneously.

References

1. Abualghaib, O., Groce, N., Simeu, N., Carew, M. T., & Mont, D. (2019). Making visible the invisible: why disability-disaggregated data is vital to “Leave No One Behind”. *Sustainability*, Vol. 11, No. 11, 3091.
2. Ayuso, S. (2007). Comparing voluntary policy instruments for sustainable tourism: the experience of the Spanish hotel sector. *Journal of Sustainable Tourism*, Vol. 15, 144-159.
3. Banks, M. L., Hameed, S., Usman, K. S., & Kuper, H. (2020). No one left behind? Comparing poverty and deprivation between people with and without disabilities in the Maldives. *Sustainability*, Vol. 12, No. 5, 2066.
4. Balossino, N., Damiano, R., Gena, C., Lillo, A., Marras, A. M., Mattutino, C., Pizzo, A., Prin, A., & Vernerio, F. (2025). Social and Telepresence Robots for Accessibility and Inclusion in Small Museums (Preprint), 1-3. arXiv
5. Benjamin, S., Bottone, E., & Lee, M. (2021). Beyond accessibility: exploring the representation of people with disabilities in tourism

promotional materials. *Journal of Sustainable Tourism*, Vol. 29, No. 2/3, 295-313.

6. Benckendorff, P. J., Xiang, Z., & Sheldon, P. J. (2019). *Tourism information technology*. CABI, London.

7. Bull, R. (2015). ICT as an enabler for sustainable development: reflections on opportunities and barriers. *Journal of Information, Communication and Ethics in Society*, Vol. 13, No. 1, 19-23.

8. Feil-Seifer, D., & Mataric, M. (2005). Defining Socially Assistive Robotics. *International Conference on Rehabilitation Robotics (ICORR)*, 465-468.

9. Gorbenko, A., Tarasyuk, O., Kor, A., & Kharchenko, V. (2018). Green economics: a roadmap to sustainable ICT development. In: *The 9th IEEE International Conference on Dependable Systems, Services and Technologies*, Kyiv, Ukraine, 561-567.

10. Gonzales-Mora, C., Garrigos, I., Celdran-Bernabeu, M., Sanchez-Giner, D., & Norberto-Mazon, J. (2025). Augmenting Tourism Websites With Voice Commands for Increasing Accessibility in Smart Tourism Destinations. *IEEE Access*, Vol. 13, 98158-98174.

11. Higgins-Desbiolles, F. (2018). Sustainable tourism: sustaining tourism or something more?. *Tourism Management Perspectives*, Vol. 25, 157-160.

12. Ndhlovu, E., Makuyana, T., & Kaitano-Dube, K. (2024). Towards Inclusive and Accessible Tourism: The Diagnostic Potential of Digital Tools. *Tourism and Hospitality for Sustainable Development*, 275-286.

13. Nizam Che Kasim, A. (2024). *AI And Digital Tech: Enabling Inclusive Tourism – OpEd*, <https://www.eurasiareview.com/22042024-ai-and-digital-tech-enabling-inclusive-tourism-oped/>, (9 May 2026).

14. Tas, A., & Tatnall, A. (2008). Using ICT to Improve the Education of Students with Learning Disabilities. In *Learning to Live in the Knowledge Society: IFIP International Federation for Information Processing* Vol. 281, 63–70. Boston: Springer.

15. Tebbutt, E., Brodmann, R., Borg, J., MacLachlan, M., Khasnabis, C., & Horvath, R. (2016). Assistive products and the Sustainable Development Goals (SDGs). *Global Health*, Vol. 12, No. 1, 79.
16. United Nations. (2006). *Convention on the Rights of Persons with Disabilities*, <https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>, (10 April 2026)
17. United Nations. *Expert Group Meeting on Building Inclusive Society and Development through Promoting ICT Accessibility: Emerging Issues and Trends*, <https://www.un.org/disabilities/documents/egm2012/final-report.pdf>, (20 April 2026).
18. United Nations., *The 17 Goals*, <https://sdgs.un.org/goals>, (11 April 2026).
19. United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*, <https://sdgs.un.org/2030agenda>, (12 April 2026).
20. UN Tourism. *Digital Transformation*, <https://www.untourism.int/digital-transformation>, (9 May 2026).
21. World Health Organization., *Disability and health*, <https://www.who.int/news-room/fact-sheets/detail/disability-and-health>, (18 April 2026).