British Journal of Global Ecology and Sustainable Development
Volume- 39, April 2025
ISSN (E): 2754-9291

IMPACT OF SMART INFRASTRUCTURE IN ECOTOURISM INDUSTRY

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Abstract
Building smart infrastructure plays a crucial role in advancing sustainable tourism. To reach goals from the UNWTO 2030 agenda, tourism must work hard to create a sustainable environment. Using AI, big data analysis, and IoT are some parts or methods to build smart infrastructure that can impact tourism. To promote sustainable travel, there is an ecotourism industry. The government also needs to consider building smart infrastructure as soon as possible and look through the long-term benefit.

Keywords: Ecotourism, smart infrastructure, technology

Introduction

The integration of technology plays a significant role in advancing sustainable tourism, operational efficiency, and guest experiences (Tafura, 2024). UNWTO has an agenda to achieve sustainable development goals 2030 by implementing a framework, adequate financing and investment in technology, infrastructure, and human resources. Based on goal 9 of UNWTO, tourism should rely on good public and private infrastructure which upgrade and retrofit to be more sustainable, innovative and efficient to move towards low carbon growth.

To achieve the goal of UNWTO, ecotourism came, especially since people realise the importance of sustainability. The ecotourism industry came to promote sustainable travel practice and also preserving natural environments and local cultures. There are so many things to preserve natural environments, one of them is to upgrade and renew infrastructure to be more sustainable. In UNWTO's report "Tourism and the Sustainable Development Goals Journey to 2030" mentioned that with ecotourism ventures which worth $100 billion annually proved that nature-based tourism is one of the fastest growing segment sectors.

The smart infrastructure came by emerging transformative technologies using artificial intelligence and big data analytics (Dimitrios, 2025). Smart infrastructure not only refers to the use of AI and big data analytics but also the Internet of Things (IoT) and renewable energy systems. This article will explore the impact of smart infrastructure on the ecotourism industry by highlighting the benefits, challenges, and future prospects.

Method

To discuss the impact of smart infrastructure on the ecotourism industry, there are 2 methods to approach by following these;

1. Literature review

By looking through the existing literature which related to smart infrastructure and ecotourism, based on peer-reviewed articles, corporate blogs, and digital books.

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2. Case studies

This world already has several ecotourism destinations that successfully implemented smart infrastructure to their tourism business. For example, Ireland. The first B.E.N (The Burren Ecotourism Network) members made the collaboration and destination development in Ireland, which directly established the ecotourism of Ireland.

Results

One of the successful countries that can implement smart infrastructure and ecotourism is Ireland. Ireland has "The Burren Ecotourism Network" model which led directly to the establishment of ecotourism in Ireland (Jarlath, 2022). The Burren Ecotourism Network was winning in the Lonely Planet's new 'Best in Community' category for 2021. The Lonely Planet described this collaboration as an impressive community collaboration with local enterprises that can transfer Ireland's Burren and Cliffs into a global leader for sustainable tourism.

The B.E.N brought positive effects in long term environmental and ecology sustainability principles which created long term job, entrepreneurship opportunities, and future economic-social growth and sustainable development.

Based on the website of All-Ireland Sustainability, ecotourism in Ireland adapted smart infrastructure by minimising waste through recycling initiatives, using renewable energy sources like solar and wind power, and also implemented water conservation. (Damian, 2024). From the same reference, Ireland uses 'Smart Travel Solutions' to attract tourists. Basically the tourists will get insights into the sustainability practices. One of the programs called 'The Green Hospitality Programme' strictly forces the certified businesses to follow sustainability criteria by making it easy for eco-conscious travelers to choose eco-friendly options.

The Ireland government also provided some intimate connection of digital platforms to connect between tourists, local guides, and experiences. Those platforms can distribute fair revenue to the community.

In the future, Ireland wants to focus by prioritizing community engagement, so the country also can get more benefit from the tourists without compromising their natural and cultural heritage. Based on the successful story of Ireland, this article can compile the benefit of smart infrastructure in the ecotourism industry.

1. Reduced environmental impact

The integration of renewable energy with AI and big data can forecast the availability of variable energy sources (Marinakis & Doukas, 2018 in Dimitrios, 2025). By integrating AI and big data. The energy sector is transforming into a more efficient, reliable, and sustainable system (Dimitrios, 2025). By making a digital platform, indirectly the Ireland's government uses AI and big data integration to make a sustainable system.

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2. Sustainable management

With the Internet of Things (IoT), the devices can communicate with each other to gather and analyze data. For example in energy management, hotels and resorts can use smart meters and sensors to track energy and water consumption. Or in waste management, the IoT device can collect the routes and schedules to reduce fuel consumption (Tafura, 2024).

The Ireland's government by the Green Hospitality Programme proves if IoT can make travel easier.

3. Sustainable cities and communities management

In the goals of the UNWTO 2030 agenda, tourism can help to advance the urban infrastructure and accessibility to promote regeneration and preserve cultural and natural heritage. By integrating data to the museum and digital marketing can reach those goals. Also investing in green infrastructure should result in smarter and greener cities for tourists and residents itself.

4. Enhanced visitor experienced

Building smart infrastructure, such as interactive kiosks, provides real time information, and green transportations can enhance the visitor experience by allowing for better planning and informed decision making (Tafura, 2024). Also make collaboration with local engineers, the government can make special apps by using VR or AR to make personalised visualization.

Discussion

Based on those benefits, the real challenges of building smart infrastructure are in financial planning and lack of sources. To build new technologies, the government must invest more, especially in touristic places. The government also needs to hire specialists who understand those special technologies. Lastly is time, because specialists must train our local engineers to maintain and develop the infrastructure itself.

Look through how Ireland manages and combines smart infrastructure and ecotourism industry, as a developed country, Ireland has more sources to maximise their tourism. However, developing countries still need extra sources, money, and time to build this smart infrastructure. The future trends are still developing. If the government can start as soon as possible, the country can adapt fastly. Also at the end, those technologies become more affordable and accessible in promoting sustainability (Buhalis & Amaranggana, 2015 in Tafura, 2024).

Conclusion

In conclusion, building smart infrastructure in the ecotourism industry can present huge opportunities for enhancing sustainability, increasing visitor experiences, and pushing community engagement. Even though the challenges about high cost, sources, and times can be considered. Learning from developed countries which successfully

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manage smart infrastructure and ecotourism can be one of the best examples to apply in developing countries.

In the end, the long term benefit of adopting smart technologies is undeniable. Ecotourism industry continues to develop, so embracing smart infrastructure will be crucial while meeting the demand of travelers that makes ecotourism unique.

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