



Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

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Abstract

The fast-changing face of technology makes it difficult for tourism stakeholders to develop an effective tourism information system. Much research has been devoted to smart tourism, especially tourist behavior and how to promote it through digital media, but few works have investigated its contribution to sustainable tourism in its entirety. This research study performs a Systematic Literature Review and a thematic analysis of 33 papers from Scopus and WoS, which evidences the need for integrating technology into all aspects of tourism: economic, social, and environmental. However, privacy concerns persist as a barrier on the part of consumers and stakeholders. For smart tourism to work, models should be inclusive, balancing the diverse interests of all parties. The emphasis should go toward accessibility, participation, and sustainability during the application of digital tools to tourism management. This research provides a framework that outlines how smart tourism can be made greener while addressing privacy and stakeholder issues. Valuable insights are provided for governments and tourism stakeholders to develop transparent, inclusive models that will integrate innovative technology with sustainable practices. Further research is recommended to explore how new technologies and collaborative governance can better position smart tourism to contribute to sustainable development globally.

Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

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INTRODUCTION

Tourism is one of the most important strategic industries for a country's growth. (Idris et al., 2021). The development of the tourism sector is also considered to be one of the ways to develop the local economy (Sumbogo & Mani, 2020). Globalization also affects the growing local economies of many countries. Tourism is one of the areas that is still changing quickly to keep up with new trends in this time of fast globalization (Hanum, 2020; Pellešová, 2020). This makes the tourism sector need to adapt quickly to the increasingly fierce environment and competition (Gajdošík, 2018; Moreno-González et al., 2020). Smart tourism is one of the alternative steps as a concept of integrative tourism sector development and can increase visitor satisfaction (Akdu, 2020).

Smart tourism is a new ecosystem that can help and promote the emergence of new ideas for how to use technology and make smart tourism experiences better. Smart tourism brings together producers, distributors, travelers, governments, and travel brokers to create and offer smart tourism experiences and services (Hanum, 2020). This smart tourism concept also has strong connectivity connecting various sectors in many countries.

Many nations globally have adopted the concept of smart tourism. A lot of innovative ideas in the tourism business use technology in smart ways, such as augmented reality (AR), virtual reality (VR), and near field communication (NFC) (Kiráľová & Pavlíčka, 2015). Different countries have used different excellent practices to manage and integrate new technology into tourism. These practices could be used to help tourism grow in Indonesia. Consequently, there is a need for literary research pertaining to the advancement of substantial smart tourism, particularly as a smart tourism development model applicable in Indonesia.

Reading literature is an important part of establishing policies for the growth of smart tourism in Indonesia (Ridwan et al., 2021). The literature used in smart tourism development can provide information about the theory to solve a problem (Hadi & Afandi, 2021). Also, looking at the most recent research on smart tourism from across the world will help Indonesia identify strategic ideas and useful models that will help its tourism industry grow.

Several previous studies in various countries have developed models that support sustainable tourism. In the economic aspect, Najmudin et. al. (2022) highlighted the importance of the concept of responsible tourism in encouraging the sustainability of the local economy of the community with a profit-sharing system. Kusumawardani (2024) also argues that the ability to innovate in the community is a key component in encouraging tourism sustainability. According to Alsahafi et al. (2023) and Suanpang & Pothipassa (2024), the integration of AI into smart tourism may offer travelers real-time information about natural resources such as water supplies and air quality at their locations. In that sense, technology is considered a

catalyst toward the sustainability of smart tourism. As Suanpang and Pothipassa (2024) also show, AI may help improve the cultural experiences of people with disabilities by giving them VR and AR experiences. With the integration of these kinds of technologies, tourism becomes more accessible for everyone and more sustainable for the environment.

The current literature on smart tourism, including studies from Indonesia, is notably missing how the model integration of smart tourism can be done in concert with local communities and ecosystems. Although previous studies, such as Najmudin et. al. (2022) and Kusumawardani (2024), identified responsible tourism and community innovation as indispensable elements for enhancing sustainability, there is very little research into the specific challenges and opportunities faced by Indonesian destinations in implementing smart tourism technologies. Furthermore, even though international studies bring up AR, VR, and AI as features likely to enhance the experience of tourists (Hanum, 2020; Akdu, 2020), there is a lack of research directed at their proper integration within the cultural and environmental context of Indonesia. In addition, despite growing interests in smart tourism globally, there is still a lack of literature on the long-term socio-economic impacts of such integrations, especially related to the involvement of local communities and the preservation of cultural heritage. This again calls for further research in the development and implementation of smart tourism models that are not only technologically advanced but also culturally and ecologically sustainable for Indonesia.

In Indonesia, smart tourism is beneficial not only to tourists but also in managing destinations and among local communities. Technology comes in handy in the tourism industry in resource management, environmental conservation, and smooth operations. Destinations need to embrace smart tourism models in order to fully exploit their tourism potential and ensure that tourism becomes sustainable for a long period. On the other hand, when properly implemented, smart tourism can provide a region with a competitive edge within the global market, thereby making it an attractive destination to environmentally-conscious travelers. The current study aims to conduct a critical review of the literature with a view to identifying how the evolution of smart tourism can foster sustainable tourism development. The findings are meant to help tourism managers and local governments maximize the tourism potential of their area by ensuring environmental sustainability.

METHOD

Systematic Literature Review

This study employed a Systematic Literature Review (SLR) based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. PRISMA is commonly used in literature reviews for three key reasons: it helps in formulating clear and systematic research questions, provides a structured approach to determine which studies to include or exclude, and grants access to a broad range of scientific databases within a set timeframe (Shaffril et al., 2021). The SLR process involves several steps, including identification, screening, eligibility assessment, quality appraisal, and data abstraction and

Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

analysis (Gillath & Karantzas, 2019). For this research, we utilized the Scopus and Web of Science databases to gather relevant information. These databases were selected because they are among the most widely recognized and frequently used worldwide (Shaffril et al., 2021). They offer comprehensive and reliable data and provide various search options, making them ideal for this study.

Identification

The first step in this study is the identification process, which involves gathering data using search terms based on the research purposes. Using the search string created, data is retrieved from the Scopus and WoS (Web of Science) databases. This procedure produced 477 articles, 45 from Scopus and 432 from WoS. The search string used is as follows:

Table 1. The search string used to collect the data processed

Databases	Keywords
Scopus	TITLE-ABS-KEY(("Model" OR "framework" OR "construct" OR "Concept*" AND "smart tourism" OR "digital tourism" OR "smart travel" OR "innovative tourism" OR "e-tourism" AND "sustainable tourism" OR "eco-friendly tourism" OR "green tourism" OR "responsible tourism" OR "eco- tourism" OR "ethical tourism" AND (LIMIT-TO (DOCTYPE, "r")) AND (LIMIT TO (PUBSTAGE, "final")) AND (LIMIT TO (SRCTYPE, "j")) AND (LIMIT-TO (LANGUAGE, "English"))
Web of Science	TI=(("smart tourism" OR "digital tourism" OR "smart travel" OR "innovative tourism" OR "e-tourism" AND "sustainable tourism" OR "eco-friendly tourism" OR "green tourism" OR "responsible tourism" OR "eco-tourism" OR "ethical tourism")) AND AB=("smart tourism" OR "digital tourism" OR "smart travel" OR "innovative tourism" OR "e-tourism" AND "sustainable tourism" OR "eco-friendly tourism" OR "green tourism" OR "responsible tourism" OR "eco-tourism" OR "ethical tourism"))

Eligibility

The second step is the eligibility procedure, which involves manually removing articles that don't meet the author's requirements. Year, type of publishing, language, and type of document are all used to decide if an article is eligible. It aims to get the best results in the WoS and Scopus databases. According to the year range, the papers in the article were published at least 10 years ago (before 2014). The sort of document employed is then based on research and not on book chapters or conference proceedings. In this search, the source type is journals that are written in English (see Table 2).

Table 2. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Doc Type	Research articles	Book chapters, conference proceedings, and books, etc
Source Type	Journal	Non-Journal
Language	English	Non-English
Year	2014-2024	Before 2014 and after September 2024

Quality Appraisal

The MMAT (Mix Methods Appraisal Tools) checklist by Hong et al. (2018) was used to check the quality of each of the publications that were found. The main reason to utilize this checklist is that it works with any kind of study design, whether it's qualitative, quantitative, or a mix of the two. The purpose of this evaluation was to identify papers that addressed the research question and facilitated a more thorough examination of the criteria for the inclusion and exclusion of studies. The scoring system for the quality assessment questions is as follows: 1 for "Yes," 0.5 for "I Don't Know," and 0 for "No." The total score for the appraisal is then divided into four categories: excellent (13.5 to 15), good (9.5 to 13), fair (5 to 9), and failed (0 to 4.5). According to the results, six articles received excellent scores (ranging from 14 to 14.5), while six other articles were classified as good (with scores between 11.5 and 13). Additionally, 21 articles scored 7 points, placing them in the fair category. In total, all 33 primary studies were selected for review (refer to Table 3).

Data Abstraction and Analysis

After the eligibility process, the remaining articles were reviewed and assessed. The findings are thoroughly examined in relation to pertinent papers that address the research topics. Articles were analyzed to discern pertinent themes through the examination of titles, abstracts, and whole contents. A review that brought together different types of study designs (qualitative, quantitative, and mixed) was conducted. Thematic analysis was employed to identify patterns and trends in the evolution of smart tourism as a means of promoting sustainable tourism.

RESULTS

The process of identifying and selecting studies for inclusion in this systematic review is described in Figure 1. Initially, a total of 477 records were identified from two databases, Scopus (45 records) and WoS (432 records). During the initial screening phase, 2 duplicate records were removed, and other records deemed ineligible by automation tools were excluded, leaving 475 records to be reviewed. Of these, 425 were excluded based on title and abstract, reducing the number of studies to 50 that were sought for full-text retrieval. However, 16 reports could not be retrieved due to access issues, where certain articles were either withdrawn or restricted by the publisher, preventing access to the full text. After assessing the eligibility of the remaining 34 reports, one was excluded because it was a review paper. Consequently, 33 studies met the inclusion criteria and were ultimately included in the final review. This selection process reflects a thorough filtering method to ensure the included studies are relevant and eligible for review.

Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

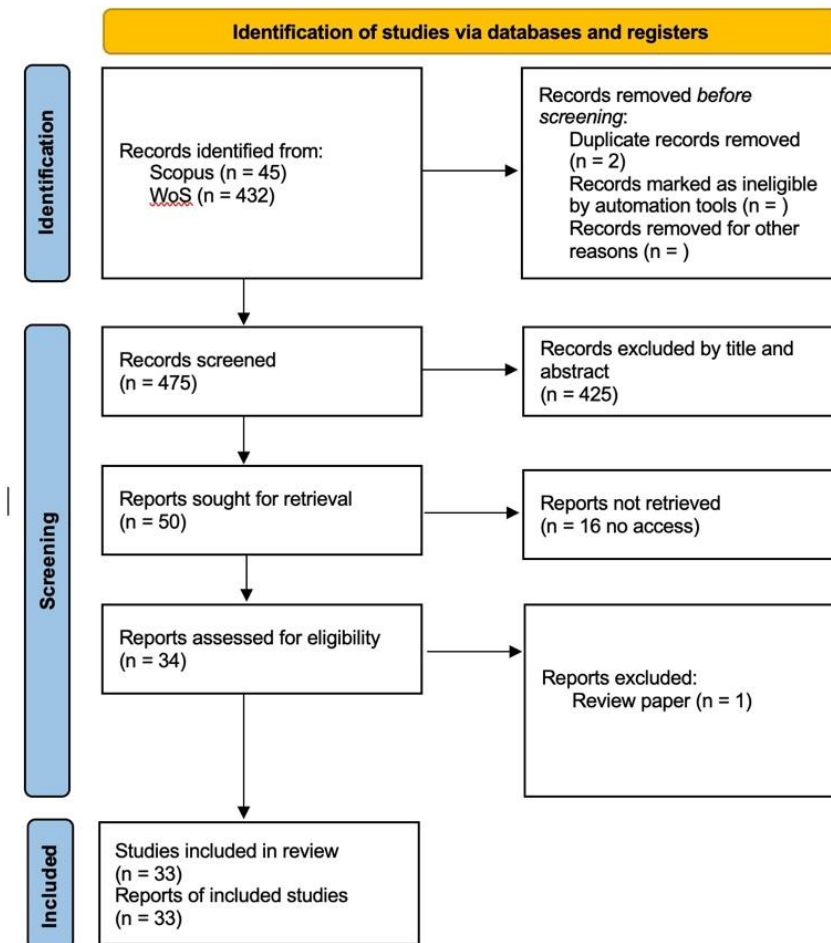


Figure 1. Flowchart of the primary studies

Table 3. Selected primary studies

ID-Paper	Year	Author	Journal Source	Quartile
P-01	2022	Mileti et al,	Land Use Policy	Q1
P-02	2021	Lu et al,	Sustainable Energy Technologies and Assessments	Q1
P-03	2022	Bazazo et al,	Geojournal of Tourism and Geosites	Q3
P-04	2017	Koo et al,	Sustainability	Q2
P-05	2020	Amir et al,	Planning Malaysia	Q3
P-06	2017	Martini et al,	Sustainability	Q2
P-07	2020	Shen et al,	Sustainability	Q2
P-08	2021	Idris et al,	Geojournal of Tourism and Geosites	Q1
P-09	2022	Lee et al,	Sustainability	Q2
P-10	2023	Rahmadian et al,	Ethics and Information Technology	Q1
P-11	2019	Mahadewi N.M.E.	Journal of Advanced Research in Dynamical and Control Systems	Q4
P-12	2019	Perles-Ribes et al,	e-Review of Tourism Research	Q4
P-13	2020	Leal et al,	Journal of Sustainable Tourism	Q1

ID-Paper	Year	Author	Journal Source	Quartile
P-14	2018	Perles-Ribes et al,	Investigaciones Regionales	Q3
P-15	2019	Lim et al,	Asia Pacific Journal of Information Systems	Q4
P-16	2023	Hussain et al,	Technology in Society	Q1
P-17	2021	Farinha et al,	Sustainability	Q2
P-18	2022	Sedarati et al,	International Journal for Quality Reserach	Q3
P-19	2021	Anser et al,	Environmental Science and Pollution Research	Q2
P-20	2019	Zubiaga et al,	Sustainability	Q2
P-21	2020	Lee, et al,	Sustainability	Q2
P-22	2021	Lu, et al,	Sustainable Energy Tecnologies and Assessments	Q1
P-23	2022	Sedarati, et al,	International Journal for Quality Reserach	Q3
P-24	2024	Kusumastuti, et al,	Sustainability	Q2
P-25	2018	Pradhan, et al,	Sustainability	Q2
P-26	2023	Xu, RR	Sustainability	Q2
P-27	2023	Lee, et al,	Journal of Hospitality and Tourism Management	Q1
P-28	2020	Gomis-López, et al,	Sustainability	Q2
P-29	2019	Tecau, et al,	Sustainability	Q2
P-30	2023	Kim, et al,	Information Processing and Management	Q1
P-31	2023	Chuang, CM	Humanities and Social Sciences Communications	Q1
P-32	2020	Huang, et al,	Sustainability	Q2
P-33	2022	Suanpang, et al,	Sustainability	Q2

Table 3 presents a detailed list of the 33 primary studies that are included in the systematic literature review on smart tourism. These studies, from 2017 to 2024, have been organized according to their publication year, authors, journal source, and journal quartile ranking. Their focus will be on smart tourism, sustainable tourism, and integrating technology into the tourism industry. The various journals represented in this table encompass an interdisciplinary approach, including sustainability, tourism management, and environmental science, among other disciplines. Studies are further organized according to their journal's quartile ranking; hence, besides entries obtained from highly rated Q1 journals, there are Q2, Q3, and Q4 journals. This means that this study is evenly distributed between high-impact factor publications and valid contributions from other highly ranked journals. The inclusion of such diversity within the selected studies from these different quartiles enhances the robustness of the review because it considers the latest research findings and other studies that make practical contributions to the formulation and implementation of smart tourism models around the world. The table illustrates the depth and breadth of the literature reviewed through the varied dimensions of scholarly perspectives on the shaping of smart tourism and on how it addresses and aligns with the imperatives of sustainability. This is an authoritative collection of literature sources that underlines the importance of smart tourism in facilitating ecologically friendly, socially responsible, and economically viable tourism development and management across regions, more specifically in view of emerging trends and technologies in the tourism sector.

Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

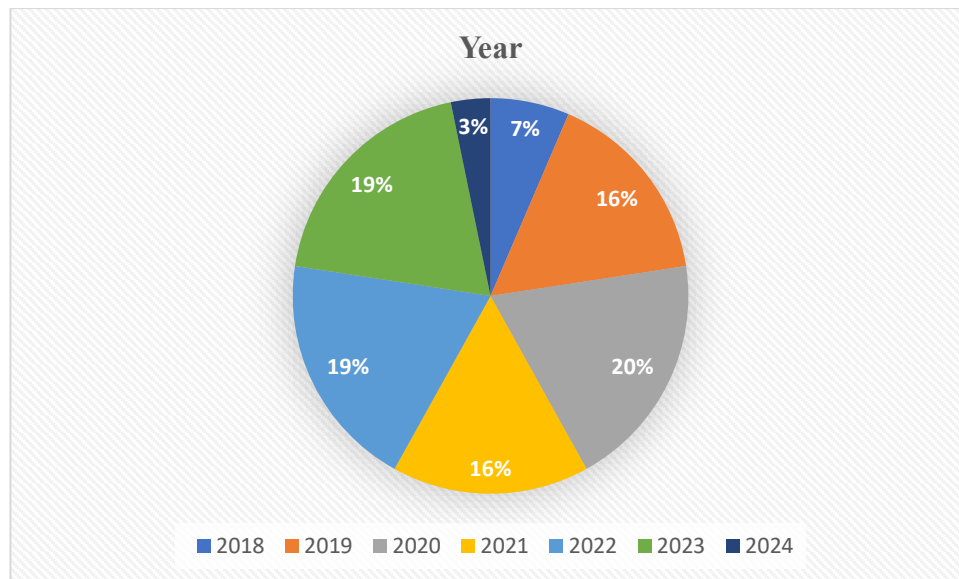


Figure 2. The distribution of publication year

Figure 2 shows publication trends in the context of smart tourism research. This illustrates that for the years 2020, 2022, and 2023, the publication share was the highest, at around 18.2% of the total number of studies in those years. This is followed by the years 2019 and 2021, each contributing 15.2% of the overall publications. The remaining contributions come from the years 2017, 2018, and 2024, contributing about 15% in total. From this, it may be interpreted that there has been a significant increase in research on smart tourism in the most recent years, especially for the years 2020, 2022, and 2023, reflecting growing interest and development in the field of smart tourism.

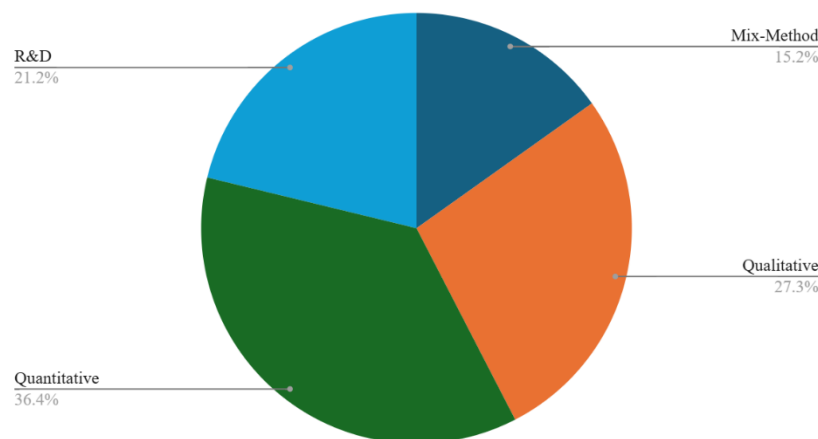


Figure 3. The distribution of research methods

Figure 3 presents the distribution of research methods in the selected studies on smart tourism. From this figure, it is observed that the selected studies on smart tourism are dominated by quantitative research methods, standing at 36.4%, hence meaning that a greater

proportion of the studies have focused on numerical data and statistical analysis in understanding smart tourism trends and impacts. On the other hand, 27.3% of the studies used qualitative research methods. The remaining 36.4% were studies conducted through the use of R&D methods and mixed methods, which combine both quantitative and qualitative approaches. The different proportions of these methods show how the nature of smart tourism research is multi-faceted, balancing empirical data analysis and theoretical exploration along with practical development to understand the field.

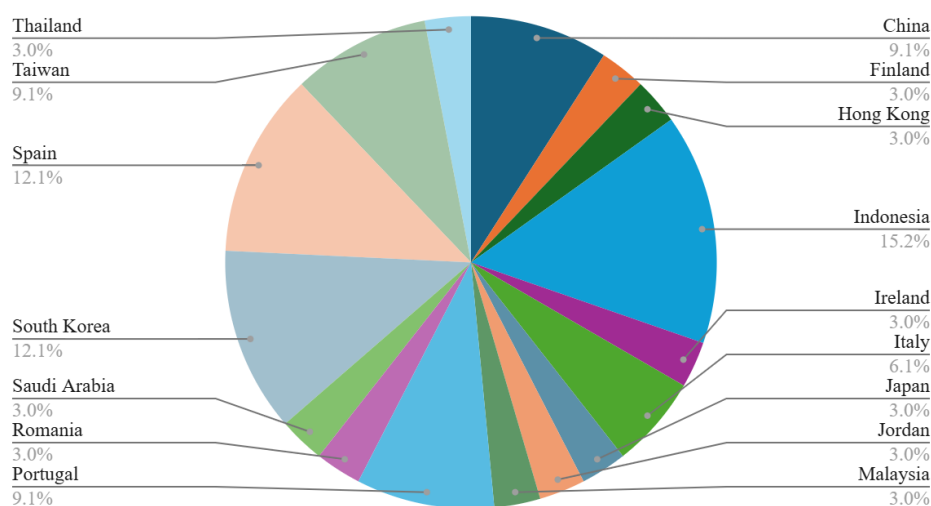


Figure 4. The distribution of countries

Figure 4 shows the distribution of countries studying smart tourism. China, Taiwan, and Portugal each contribute 9.1% of total smart tourism research. Indonesia is the largest single contributor, its 15.2% of researched smart tourism reflecting the growing interest in and development of smart tourism in that country. Spain follows with 12.1% of the research contributions. The remaining studies originate from different other countries, which implies that smart tourism is a global topic, since a variety of regions provide substantial research in this field. This further suggests that though countries like China, Taiwan, and Portugal are into smart tourism research, Indonesia and Spain are major contributors in the development and integration of smart tourism practices.

DISCUSSION

Referring to the results of data extraction, there were 33 research papers included in the review process, and at this stage, the data underwent thematic analysis. This study focuses on four primary issues that emerged from the data analysis: economic and business, social and cultural, technology, and environment.

Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

Economic Businesses and Technologies in Smart Tourism

Different methods and techniques have been found in the literature that can be proposed for incorporating modern technologies into the tourism sector, making it more sustainable by improving the visitor experience. Among those, green architecture, waste management, and energy efficiency can be combined into a Data-Driven Sustainable Smart City Framework. The underpinning philosophy of this approach is that emerging technologies will be adopted to enhance the visitor experience while supporting environment-friendly improvements to the visitor experience. Employing these technologies, DDSSCF may help contribute to the sustainability and efficiency of the tourism industries.

This study also applies the notion of Smart Sustainability, whereby ICT is implemented by the government. It assesses how the notions of smart cities and sustainability can be connected to reduce the effects of tourism. This is in agreement with studies that apply big data processing models in the forecast of tourist inflow in tourists. Integration of Smart Data can lead to better job prospects as well as foreign exchange earnings (Pradhan et al., 2018).

User resistance to recommendation systems presents a major barrier to the integration of innovative technologies in tourism. The Technology Acceptance Model and the status quo bias theory present perceived value and cost as significant determinants of technology acceptance despite the manifold benefits that come with its use. While support and self-efficacy facilitate users' acceptance of new technology, overcoming resistance remains an obstacle.

In Malaysia, ecotourism and smart tourism face challenges in the level of awareness, privacy concerns, and insufficient strategies in implementation. Thus, broader framework conditions should be established to solve these problems (Amir et al., 2020). Indonesia, on the other hand, has greater opportunities regarding knowledge sharing and sustainable tourism promotion through a Virtual Reality-based information system such as SIPADU (Idris et al., 2021).

Also, the Innovative Tourism Ecosystem Model P-18-emphasizes systems thinking by showing how new technologies link the social, economic, and environmental subsystems. In turn, the attainment of objectives in sustainable tourism depends on understanding such links. Further, in research on nomadic tourism in Bali, Kusumastuti et al. (2024) found that digital strategies, along with homestays, can improve sustainability and enhance visitor experience at destinations.

However, Lee & Jan (2023) add that, in Spain, beach destinations are finding it hard to implement smart tourism other than in terms of urban renewal and upkeep. For example, even where tourism is presented as smart, many aspects boil down to little more than cosmetic changes. Furthermore, welcoming tourism approaches for people with family members who have disabilities also involves overcoming problems concerning attitudes, physical access, and information provision. The difficulties can be resolved through reforms in education and the use of VR, such as in Gomis-López & González-Reverté, 2020. In turn, a recent proposal about a gamification app for the blind tourist to Hong Kong by Chuang (2023) identifies how

gamification apps can help make communities more autonomous as well as socially and ecologically active.

Huang & Lau (2020) explain how the metaverse can be put into use within smart tourism in Thailand, proposing multi-functional virtual tourism experiences for the contribution toward developing sustainable destinations. Lastly, Shen et al. (2020) describe how social media can influence the sustainable behavior of technology-savvy, eco-conscious consumers. Overall, these findings suggest that the adoption of new technologies in the tourism sector can significantly enhance the experience of visitors and further the environmental sustainability of this industry. Nevertheless, various challenges need to be addressed before such technologies can actually be put into practice by industry operators.

Socio-cultural and Environmental Aspects in Sustainable Tourism

Various approaches and concepts have been developed focusing on incorporating smart technologies into the tourism industry with the aim of sustainable tourism development and benefiting tourists. For example, tourism resources and products are encouraged to be more inclusive, such as family tourism including children with disabilities. Of course, this kind of tourism is confronted with some serious issues, such as accessibility, attitude problems, and information dissemination, although it can also be resolved through educational reform and virtual reality training. Therefore, smart tourism can be applied to enhance the visitor's experience in destinations on the following main points: Chuang (2023) discusses an app for the gamification of tourism for the blind or those with low vision in Hong Kong. Such applications will help heighten autonomy, social activity, and a meaningful life, which is critical in attaining relevant aspects of sustainable development. Huang and Lau (2020) investigate smart tourism in Thailand using the metaverse and point out that smart tourism platforms provide opportunities to develop fascinating, flexible tourism experiences that enhance sustainability. From another perspective, Shen et al. (2020) indicate that social media can facilitate technology-savvy travelers, especially in China, in adopting environmentally friendly behavior while traveling. All these studies show that even though smart technologies can improve the tourism experience and contribute to environmental sustainability, much remains to be addressed in fully and effectively implementing these technologies within the sector.

It has already employed smart technologies in nature-based tourism to improve visitor experiences and eco-friendly behavior. Lee and Jan (2022) created a Smart Tourism Experience Scale specifically for groups in nature-based tourism. The scale examines how new technologies enhance satisfaction, loyalty, and support for sustainable tourism by way of the encouragement of environmentally conscious behaviors, which has the potential of making sustainability more prominent throughout local communities. Moreover, the application of Digital Twin technology encourages more transparency and sharing of stakeholder data through big data governance, further enhancing sustainable tourism management practices

Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

(Rahmadian et al., 2023). It unlocks a holistic view of the social and environmental status of tourist destinations, pointing toward a better decision-making process for the sustainable management of natural and cultural resources.

When incorporating new technologies for tourism, the management of crowdsourced data should be taken into consideration. The data management should incorporate ART: Accountability, Responsibility, and Transparency, that is, any management of data should not be secretive but rather transparent. In this respect, secretive data management can easily lead people to lose their trust and further decrease the effectiveness of these smart tourism platforms (Perles-Ribes & Ramón-Rodríguez, 2019). Thus, responsible data management incorporating ART will help regain confidence in the public in this sector and ensure that smart tourism complements social and environmental sustainability. To this end, Perles-Ribes and Ivars Baidal (2018) introduced the Capability Maturity Model for smart tourism to guide communities in developing sustainable and innovative tourism products. The model is based on collaboration and plans that consider the integration of social, cultural, and environmental perspectives along with technological applications for greener and more socially responsible tourism solutions.

According to Hussain et al. (2023), social and cultural sustainability challenges have been identified for stakeholders in e-tourism projects in the Algarve region. The issues identified show different perceptions of sustainability within local communities that should be taken care of through policies considering the social and cultural point of view of each area. Such situations depict that tourism policies have to respect the social and cultural contexts of every destination to avoid any resistance or adverse social consequences. For example, monitoring of tourist flow through IoT and GIS technology in historical centers allows for the partial solution of problems created by overtourism. In this regard, the objective is to provide data-based tools to city officials with the aim of regulating tourism, not only to protect the environment but also to protect the cultural heritage of a particular region (Anser et al., 2021). Such measures allow for decisions sensitive to dynamic social and cultural changes within areas receiving tourism.

While technology can add to sustainability, a number of studies indicate that the emphasis on technological features is excessive, sometimes at the expense of social and cultural sustainability. In order for sustainable tourism to contribute to local knowledge and a circular economy, stakeholders need to derive policies that balance the technological and socioeconomic influences. For example, the post-smart tourism community-nurturing digital skills, circular economy practices, and local knowledge-offers another dimension in which tourism can thrive without being driven totally by technology. It is a means through which technology can be married with strongly held local values, such as respect for cultural norms and tradition, to achieve more holistic sustainability.

In all, smart technologies in tourism might have the potential to ameliorate social, cultural, and environmental sustainability; it is very important that such technologies be implemented

in a thoughtful manner. Technology must work to support and complement cultural and social experiences, not replace them. A holistic approach that integrates local knowledge and cultural sustainability with technological progress in a non-exclusionary fashion is fundamental for these innovations to contribute positively toward the betterment of the tourism industry.

Challenges of Smart and Sustainable Tourism

There are, however, still many challenges that need to be overcome for smart tourism geared towards sustainability. Two main challenges are data storage and overtourism. Overtourism, or a spot having too many visitors to be sustainable or enjoyable for the tourists themselves, can harm the environment and erode the quality of that tourist experience. Furthermore, as Fyall & Garrod (2020) and Szromek et al. (2019) underlined that overtourism exerts a negative effect on environmental sustainability, therefore undermining the experience of tourists.

Apart from that, for big data management in smart tourism, privacy and data security are two other issues that need to be taken into consideration. The user data applied for tourism activities is very much essential to be kept safe, while ensuring trust with regulatory authorities. Moreover, the implementation of green technology is required for reducing environmental impacts related to tourist activities. A structured way of dealing with large data, such as DFAD (Documentation Framework for Architecture Decisions), will help to overcome the challenges by making parties responsible as well as transparent. This framework provides a clear mechanism for the organization and circulation of data, which benefits the tourism industry as well as the environment. Ibrahim & El-Mawla (2022), Islam (2023) also emphasized the importance of linking IoT devices to enable the flow of information among devices. Thus, it enables the transparent use of tourism data, resulting in the operation of tourism having minimal environmental impacts.

Adding IoT to the tourism industry can help destinations minimise their operating expenses and have less impact on the environment (Ibrahim & El-Mawla, 2022). The tourism business may become more efficient, sustainable, and eco-friendly by using smart technologies. This will make the experience better for both guests and the environment.

CONCLUSION

The integration of technology in social, economic, and environmental aspects is the key to the success of sustainable smart tourism. In the economic aspect, digitization needs to be done in every transaction in every destination. Then, tourism innovations related to VR are also an opportunity for destination administrators to attract tourists. In addition, the concept of smart tourism in social and environmental aspects also needs to be considered by stakeholders to build an ERB for tourists. However, technology adaptation is a big problem that remains unresolved. User data privacy and security are one of the threats to managing big data in the technology sector. Thus, there is a need for active collaboration in the field of training and empowerment of local communities in supporting sustainable smart tourism. It is intended that

Leveraging technology for sustainable tourism: A comprehensive literature review on smart tourism

local communities can compete nationally and internationally in creating inclusive tourism. Governments and tourism managers should support training programs that will prepare the local community to understand, adopt, and manage smart tourism technologies. Further research is needed to determine how collaborative governance, together with new technological developments, can further contribute to sustainable tourism development by setting up region-specific smart tourism models that balance innovation with cultural and environmental sustainability.

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DECLARATION

Grammarly was used by the authors to assess the quality of the language and enhance its readability and clarity. The writers take full responsibility for the publication's content after using this tool, reviewing and editing it as necessary.

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