



ORIGINAL RESEARCH ARTICLE

Assessment of Smart Tourism Information Systems (STIS) For Sustainable Tourism Management in Some Selected Hotels in Ilorin West Local Government Area of Kwara State, Nigeria

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DOI: <https://doi.org/10.64290/giges.v6i2.56>

ARTICLE INFO

Article History:

Received 16th June 2026

Revised 19th June 2026

Accepted 22nd July 2026

Keywords:

- Hotels;
- Information;
- Smart Tourism;
- Sustainable Tourism Management;
- Kwara State

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ABSTRACT

This study analyzed the role of Smart Tourism Information Systems (STIS) in promoting sustainable tourism management among selected hotels in Ilorin-West LGA of Kwara State. Smart Tourism Information Systems incorporates digital technologies such as Artificial Intelligence (AI), Big Data, the Internet of Things (IoT), and cloud computing to improve efficiency, enhance guest satisfaction, and support environmental conservation. Using a structured questionnaire administered to 80 respondents across five hotels, the study employed descriptive statistics to evaluate STIS adoption, challenges, and strategies. Findings revealed that STIS positively influence operational efficiency and sustainability, but adoption is hindered by high implementation costs, limited technical skills, and poor internet infrastructure. The study recommends staff training, government incentives, stakeholder collaboration, and investment in affordable, scalable technologies to enhance smart tourism integration. Overall, the research concludes that embracing STIS can significantly contribute to Nigeria's sustainable tourism development.

Introduction

Tourism plays a significant role in economic growth and sustainable development worldwide. With the increasing adoption of technology, the tourism industry has evolved through the integration of Smart Tourism Information Systems (STIS), which enhance service efficiency, improve visitor experiences, and promote sustainability (Jia, 2023). STIS refers to digital platforms that utilize artificial

intelligence (AI), big data analytics, cloud computing, and the Internet of Things (IoT) to facilitate real-time data processing, personalized services, and effective decision-making for both tourists and tourism service providers (Galvão *et al.*, 2024). As the hospitality sector adapts to modern digital trends, STIS has become a key component in achieving operational efficiency, resource conservation, and enhanced customer satisfaction.

Sustainable tourism management focuses on minimizing the negative environmental, economic, and social impacts of tourism while maximizing its benefits. It emphasizes responsible tourism practices such as resource conservation, waste reduction, community engagement, and eco-friendly operations. Hotels, as crucial stakeholders in the tourism industry, play a central role in ensuring sustainability through the implementation of smart solutions. By leveraging STIS, hotels can automate energy usage, optimize water consumption, improve waste management, and enhance customer service through smart booking systems and contactless check-ins. This integration not only improves business efficiency but also contributes to long-term sustainability by reducing the environmental footprint of hospitality operations (Flórez *et al.*, 2024).

In Ilorin west, Kwara State, the hospitality industry is gradually expanding as tourism activities increase. However, many hotels still rely on traditional management systems, which may not align with modern sustainability and efficiency standards. The adoption of STIS in Ilorin's hotels presents an opportunity to modernize the sector, offering smart solutions for improved tourism experiences and environmental responsibility. Despite its benefits, challenges such as high implementation costs, limited digital literacy, and inadequate infrastructure may hinder widespread adoption (Nazare *et al.*, 2023). This study aims to analyze the extent of STIS adoption in selected hotels in Ilorin and its impact on sustainable tourism management, providing insights into the feasibility and

potential of smart tourism solutions in Nigeria's hospitality sector.

Materials and Methods

Study Area

Ilorin is located between latitudes 8°30' and 8°50' N of the Equator, and between Longitudes 4°20' and 4°35' E of the Prime Meridian, with an area of about 100km² (Kwara State Diary 2008; Adediji *et al.*, 2009). The city is situated in the transitional zone between the forest and savannah regions of Nigeria. The city comprises part of three Local Government Areas (LGAs): Ilorin East, Ilorin-West and Ilorin-South LGAs with about twenty political wards (Figure 1). The city has continued to grow rapidly over time, particularly after it gained the status of a state capital in 1967. The population of Ilorin is projected to be 1,049,168 by 2013. Rapid socio-economic growth and physical development have encouraged the inflow of people from different parts of the country. The population of Ilorin Community is mixed, which explains why the city is often described as a melting pot for many Nigerian linguistic groups. In Ilorin, there are Yoruba, Hausa, Fulani, Nupe, Kanuri, and the Gobawas. It is these and other cultural groups that makes up the population of Ilorin.

Research Instrument

The data for this study was drawn from two main sources; primary and secondary sources. The researcher collected primary data by using a survey questionnaire. The secondary source was obtained from journals, books, internet, publications, manuscripts and other sources where information relatable to this study could be obtained.

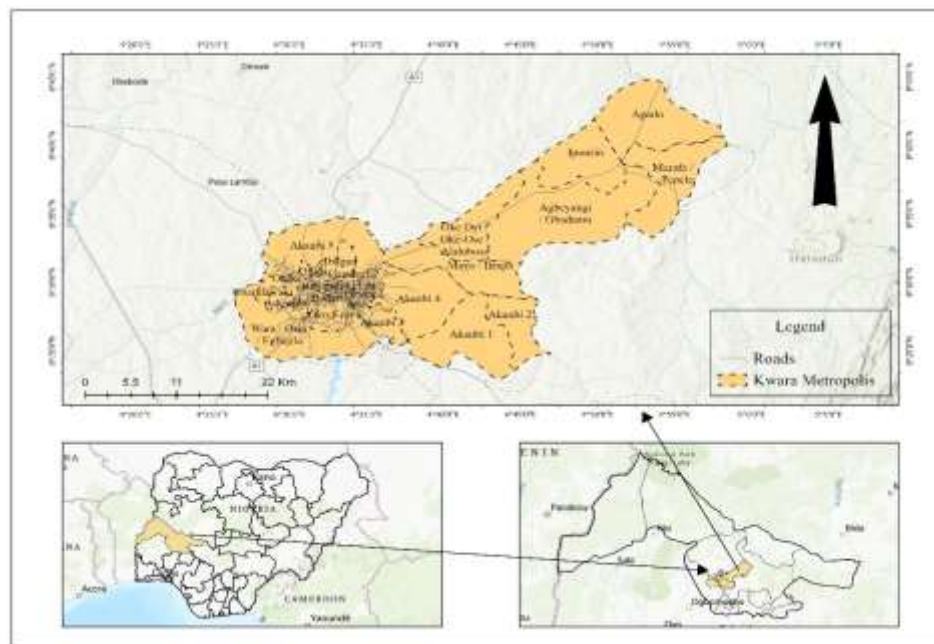


Figure1: The Study Area

Source: Adapted from Administrative map of Kwara state.

Study Population

The study population for this research consists of key stakeholders in the hospitality and tourism sector within selected hotels in Ilorin west, Kwara State, Nigeria. These stakeholders include:

1. Hotel Managers and Administrators – Individuals responsible for decision-making, technology adoption, and overall management of hotel operations. Their insights will help assess the extent of STIS adoption, challenges, and strategic implementation in sustainable tourism management
2. Hotel Employees – Staff members who interact directly with Smart Tourism Information Systems (STIS) in their daily operations. They provide perspectives on usability, efficiency, and the impact of STIS on workflow and service delivery
3. Hotel Guests and Tourists – Visitors who experience STIS-driven services, such as smart check-ins, automated room controls, and digital concierge services. Their feedback will provide insights into customer satisfaction and the role of STIS in enhancing tourism experiences
4. ICT and Tourism Experts – Professionals in technology, hospitality, and tourism development who can provide expert opinions on the feasibility, scalability, and future potential of STIS in sustainable tourism

Sample Size

Questionnaires was administered to a total of 80 respondents

Table 1: Population Distributions of the Respondents

Category	Total Respondents	Respondents per Hotel (5 hotels)
Hotel Managers & Administrators	10	2 per hotel
Hotel Employees	30	6 per hotel
Hotel Guests & Tourists	30	6 per hotel
ICT Experts	10	2 per hotel
Total	80	16 per hotel

Sampling techniques

For this research study population and the five hotels were selected using stratified sampling method and a total of eighty (80) respondents were purposively sampled and selected for this study using the allocation above.

Method of Data Analysis

Data obtained was analyzed using descriptive statistics where results were expressed in tables, frequency and percentage.

Results

Table 2: Demographic information of respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	48	60.0
	Female	32	40.0
Age group	18–25 years	25	31.2
	26–35 years	29	36.2
	36–45 years	19	23.8
	46 years and above	7	8.8
Educational qualification	SSCE	18	22.5
	OND/NCE	17	21.2
	HND/BSc	35	43.8
	MSc/PhD	10	12.5
Position in hotel	Front Desk Staff	21	26.2
	Manager	12	15.0
	IT/ Admin Staff	19	23.8
	Housekeeping	12	15.0
	Other	16	20.0
Years of experience in hospitality	Less than 1 year	15	18.8
	1–3 years	24	30.0
	4–6 years	26	32.5
	More than 6 years	15	18.8
Total		80	100.0

Source: Field survey, 2025

Table 2 shows the demographic composition of the respondents. Males (60.0%) outnumber females (40.0%), with the largest age category being 26–35 years (36.2%), followed by 18–25 years (31.2%). The educational profile indicates that most respondents (43.8%) hold HND/BSc qualifications, suggesting a relatively skilled workforce. Staff roles are spread across front desk (26.2%), IT/Admin (23.8%), and other

positions (20.0%), with managers and housekeeping staff each accounting for 15.0%. In terms of experience, the highest proportion (32.5%) have worked in hospitality for 4–6 years, followed by 1–3 years (30.0%). This distribution reflects a workforce with a mix of youthful energy and moderate professional experience, suitable for engaging with and implementing Smart Tourism Information Systems (STIS).

Table 3: Impact of STIS on sustainable tourism management

Statement	SD Freq	SD %	D Freq	D %	N Freq	N %	A Freq	A %	SA Freq	SA %	Mean	Rank
STIS have improved business performance and guest satisfaction	7	8.8	10	12.5	18	22.5	28	35.0	17	21.2	3.48	A
Smart systems help manage energy and water use effectively	8	10.0	12	15.0	15	18.8	30	37.5	15	18.8	3.44	A
STIS promote cultural tourism and guest understanding of local heritage	9	11.2	12	15.0	18	22.5	27	33.8	14	17.5	3.36	A
Hotel's use of smart systems supports environmental sustainability	6	7.5	11	13.8	18	22.5	28	35.0	17	21.2	3.51	A
Local communities benefit from the use of smart systems in tourism	10	12.5	13	16.2	17	21.2	25	31.2	15	18.8	3.28	A

Source: Field survey, 2025 **Expected mean > 2.99**

Key: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree; A = Accepted; R = Rejected

Table 3 reveals that all impact items achieved mean values above the benchmark of 2.99, indicating general acceptance of STIS benefits in the hotels surveyed. The strongest agreement was with “supporting environmental sustainability” (mean = 3.51) and “improved business performance and guest satisfaction” (mean = 3.48). While perceptions are positive across all statements, the means below 4.0 suggest room for further enhancement of STIS effectiveness.

Table 4 indicates that all identified challenges met the expected mean threshold of 2.99, meaning they are widely acknowledged as real issues. The highest-rated barrier is *high costs* (mean = 3.50), followed closely by *staff training needs* (mean = 3.46). Poor internet connectivity and limited technical support also rank high, reflecting infrastructural and capacity constraints that hinder STIS adoption.

Table 4: Challenges limiting the adoption of STIS in selected hotels

Statement	SD Freq	SD %	D Freq	D %	N Freq	N %	A Freq	A %	SA Freq	SA %	Mean	Rank
Poor internet connectivity affects smart system usage in our hotel	9	11.2	12	15.0	16	20.0	28	35.0	15	18.8	3.39	A
High costs prevent full adoption of smart systems	7	8.8	10	12.5	15	18.8	29	36.2	19	23.8	3.50	A
There is limited technical support for managing smart tools	8	10.0	11	13.8	17	21.2	27	33.8	17	21.2	3.39	A
Staff need more training to use smart technologies effectively	6	7.5	11	13.8	17	21.2	28	35.0	18	22.5	3.46	A
Government and hotel associations should support smart tourism initiatives	10	12.5	12	15.0	17	21.2	26	32.5	15	18.8	3.23	A

Source: Field survey, 2025 **Expected mean > 2.99****Key:** SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree; A = Accepted; R = Rejected**Table 5:** Strategies for improving STIS adoption in selected hotels

Statement	SD Freq	SD %	D Freq	D %	N Freq	N %	A Freq	A %	SA Freq	SA %	Mean	Rank
Training programs should be organized to build staff capacity in digital tourism systems	8	10.0	12	15.0	16	20.0	27	33.8	17	21.2	3.33	A
Partnerships with ICT providers can enhance smart service delivery	9	11.2	13	16.2	18	22.5	26	32.5	14	17.5	3.21	A
Hotels should invest in affordable and scalable smart technologies	7	8.8	11	13.8	17	21.2	28	35.0	17	21.2	3.41	A
Government should provide incentives to support digital tourism innovation	8	10.0	14	17.5	18	22.5	25	31.2	15	18.8	3.24	A
Collaboration among tourism stakeholders is key to successful STIS implementation	5	6.2	8	10.0	15	18.8	34	42.5	18	22.5	3.68	A

Source: Field survey, 2025 **Expected mean > 2.99****Key:** SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree; A = Accepted; R = Rejected

Table 5 shows that all proposed strategies were accepted by respondents as effective for improving STIS adoption. Collaboration among stakeholders recorded the highest mean (3.68),

highlighting the importance of collective action. Other notable strategies include investing in

affordable/scalable technologies (3.41) and organizing training programs (3.33). Partnerships with ICT providers and government incentives were also acknowledged, though with slightly lower mean scores.

Discussion

The demographic profile shows that the majority of respondents were male (60.0%) while females accounted for 40.0%. The dominant age category was 26–35 years (36.2%), followed by 18–25 years (31.2%). This reflects a relatively young and active workforce in the hospitality industry, which aligns with earlier studies suggesting that younger employees are more receptive to adopting new technologies such as STIS (Law, Buhalis, & Cobanoglu, 2014). Educationally, a significant proportion (43.8%) possessed HND/BSc qualifications, indicating a reasonably skilled workforce capable of understanding and operating technology-based systems. Respondents occupied diverse positions including front desk, IT/admin, and managerial roles, ensuring perspectives from both operational and decision-making levels. In terms of professional experience, the majority had between 1–6 years in hospitality, which is consistent with findings that mid-career employees often combine technological adaptability with practical industry experience (Tussyadiah, 2020). These demographic features are important because they influence the readiness and capacity of hotel staff to adopt and utilize smart tourism solutions effectively (Buhalis & Amaranggana, 2015).

The findings indicate that all impact statements recorded mean values above the expected threshold (2.99), suggesting general agreement among respondents that STIS positively contribute to sustainable tourism management in the selected hotels. The highest-rated impact

was “supporting environmental sustainability” (mean = 3.51), followed by “improved business performance and guest satisfaction” (mean = 3.48).

This aligns with previous research which emphasizes that smart systems can optimize energy and water usage, reduce waste, and improve operational efficiency, thereby contributing to environmental and economic sustainability (Gretzel *et al.*, 2015). Similarly, the positive rating for guest satisfaction is supported by Neuhofer, Buhalis, and Ladkin (2015), who found that STIS enhance personalization, service speed, and overall guest experience.

However, while all items were accepted, the mean scores remained in the moderate agreement range (3.28–3.51), suggesting that although benefits are recognized, there is potential for greater impact through broader or more advanced implementation. This is consistent with studies noting that the sustainability benefits of STIS are maximized only when integrated across all operational areas of a hotel (Shafiee *et al.*, 2019).

These findings are in line with prior studies in developing economies, where the initial investment and ongoing maintenance of smart systems are often prohibitive for small and medium-sized hospitality businesses (Ali, Frew, & Fesenmaier, 2014). Furthermore, lack of technical expertise and limited infrastructure – especially internet reliability – have been widely documented as barriers to digital transformation in tourism (UNWTO, 2020). The identification of staff training as a key challenge echoes the work of Wang *et al.* (2016), who stressed that even when technology is available, insufficient human capital can hinder its effective application.

The strategies for improving adoption and effectiveness of STIS indicated that all proposed strategies were accepted, with the highest-rated being “collaboration among tourism stakeholders” (mean = 3.68). This underscores the importance of partnerships between hotels, ICT providers, tourism boards, and local communities in overcoming resource and knowledge constraints (Sigala, 2018). “Investing in affordable and scalable smart technologies” (mean = 3.41) and “organizing training programs” (mean = 3.33) also ranked highly, indicating recognition that both financial feasibility and human capacity are critical for successful adoption. Government incentives (mean = 3.24) and ICT partnerships (mean = 3.21) were accepted but rated slightly lower, perhaps reflecting skepticism about the reliability of external support mechanisms. These findings are consistent with Gretzel *et al.* (2015) and Buhalis & Leung (2018), who argue that multi-stakeholder collaboration and phased technology adoption are vital to the success of smart tourism initiatives, especially in emerging markets where resources are limited.

Conclusion and Recommendations

The study concludes that STIS are recognized as valuable tools for advancing sustainable tourism management in hotels within Ilorin West. Their adoption leads to improved operational efficiency, enhanced guest satisfaction, and contributes to environmental and cultural sustainability. However, the realization of their full benefits is hindered by financial, infrastructural, and human-capacity constraints. Overcoming these challenges will require coordinated action among hotel management, government agencies, ICT providers, and local communities. By fostering collaboration, enhancing staff capacity, and ensuring affordable, reliable technological solutions, hotels can leverage STIS more effectively to

promote sustainable tourism and boost local socio-economic development.

Recommendations

In light of the discussion above, the following are recommended:

Enhance Staff Training and Digital Literacy:

Hotels should conduct continuous training workshops to build digital skills among employees, ensuring they can effectively operate and maintain STIS for daily operations.

Adopt Cost-Effective and Scalable Technologies:

Hotels should prioritize affordable, modular smart systems that can be upgraded over time, minimizing the financial burden of large one-time investments.

Strengthen Multi-Stakeholder Collaboration:

Partnerships should be established between hotels, ICT providers, government agencies, and local communities to pool resources, share expertise, and jointly drive smart tourism adoption.

Government Incentives and Policy Support:

Tourism authorities should provide incentives such as tax rebates, grants, or infrastructural support to ease the financial and technical burden of STIS adoption.

Improve Internet and Technical Infrastructure:

Reliable connectivity and consistent technical support should be prioritized through collaboration with ICT firms and service providers in hospitality hubs.

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