GPH-International Journal of Social Science and Humanities Research
(Online ISSN: 3050-9637)
Vol. 9, No. 4, April 2026
Global Publication House
DOI: https://doi.org/10.5281/zenodo.20083104
Online: www.gphjournal.org | https://gphjournal.org/index.php/ssh/index

# Design of a Smart Tourism Platform for Enhancing Visitor Experience and Flexible Learning by Students of Tourism in Bauchi State

**Murtala Mohammed Alamai and Fa'iz Ibrahim Jibia**
Department of Tourism Management Technology and ICT/MIS Directorate,
Federal Polytechnic Bauchi, Bauchi State, Nigeria.
**Email:** ammurtala@fptb.edu.ng **ORCID-ID:** 0000-0002-0185-2251

## Abstract

The global digitalization of tourism has revolutionized destination management, yet many regions in developing countries remain constrained by fragmented information systems and inadequate educational tools. Bauchi State, Nigeria, possesses significant tourism assets, including the Yankari Game Reserve, Wikki Warm Spring, and the Tafawa Balewa Tomb; however, these attractions remain underutilized due to limited digital integration and infrastructure gaps. This study proposes the design of an offline-first, multilingual Smart Tourism Platform (STP) tailored to the Bauchi context to simultaneously enhance visitor experiences and support flexible learning for tourism students. Adopting a mixed-methods Design Science Research (DSR) approach, the study involves stakeholder interviews, visitor surveys (N=50), and student needs assessments (N=100). The proposed platform integrates geolocation, digital storytelling, augmented reality, and e-learning modules, specifically engineered to function in low-connectivity environments. The article develops a conceptual architecture and evaluates the platform's impact on destination competitiveness and pedagogical engagement. Findings indicate that the STP significantly improves destination accessibility, tourist decision-making, and experiential learning. Ultimately, this research contributes a context-specific model for smart tourism development in emerging destinations across sub-Saharan Africa.

## Keywords:

*Smart tourism, digital tourism, visitor experience, flexible learning, Bauchi State, tourism education, tourism platform, Nigeria.*

## Introduction

The global tourism landscape is undergoing a paradigm shift driven by digital technologies that redefine how visitors search for information, plan journeys, and engage with destinations. The emergence of Smart Tourism has transitioned destination management from static promotion to integrated digital ecosystems leveraging the Internet of Things (IoT), data analytics, and mobile applications to co-create value (Gretzel et al., 2015). In Nigeria, tourism is recognized as a vital pillar for economic diversification under the National Development Plan (2021–2025). Within this framework, Bauchi State stands as a premier destination in Northern Nigeria, possessing a rich tapestry of ecological and cultural assets, including the Yankari Game

Reserve, Sumu Wildlife Park, the Tomb of Sir Abubakar Tafawa Balewa, and various traditional festivals.

Despite this immense potential, Bauchi's tourism sector remains digitally underserved. Current operations rely heavily on manual processes, leading to fragmented information, low online visibility, and inefficient reservation systems. A critical "Information Gap" exists between the high-value tourism resources available and the digital tools used to access them. Furthermore, a significant Theory-Practice Gap persists in tourism education at institutions like the Federal Polytechnic Bauchi (FPTB). Students often study smart tourism through global lenses but lack localized digital tools to apply these concepts to the specific socio-economic and infrastructural realities of their immediate environment.

Existing digital solutions often fail in this context because they assume ubiquitous high-speed internet connectivity, ignoring the regional reality where internet penetration remains below 30% (NBS, 2024). Moreover, these platforms rarely reflect the linguistic and cultural identity of the region, specifically the widespread use of the Hausa language. This research identifies a Connectivity Paradox, while smartphone ownership among visitors and students is high, reliable data access is low, particularly at remote tourism sites. To bridge these gaps, this study proposes the design of a Smart Tourism Platform (STP). This platform is uniquely engineered to be offline-capable and multilingual, serving as a dual-purpose tool: a Digital Concierge for visitors and a Virtual Laboratory for students.

The objective of this article is to develop a comprehensive design for a Smart Tourism Platform that enhances visitor experiences and facilitates flexible, technology-driven learning for tourism students in Bauchi State.

## Problem Statement

Although Bauchi State possesses substantial tourism resources, these assets are not sufficiently supported by integrated digital technologies. Current tourism information is dispersed across outdated brochures and fragmented social media pages, lacking a unified system for real-time booking, route planning, or historical interpretation. This absence of a centralized digital hub results in tangible losses across the Triple Helix of stakeholders:

- Visitors face frustration due to manual booking bottlenecks and unreliable site data (TripAdvisor, 2024).
- SMEs and Local Artisans lose revenue because of linguistic exclusion and a lack of digital presence to showcase products to international tourists (NTDA, 2023).
- Government Agencies lack the real-time analytics necessary for informed infrastructure development and resource allocation (BSTDC, 2023).

Compounding these issues is the exclusion of the academic community from the digital tourism value chain. Students of tourism at tertiary institutions face restricted professional competency development due to limited field exposure and the high cost of travel to remote sites. Current educational models fail to provide flexible, simulated environments that could mitigate these barriers.

Furthermore, the one-size-fits-all approach of existing tourism apps neglects the connectivity constraints of the Northern Nigerian corridor and the linguistic preference for Hausa among

local stakeholders. Consequently, there is an urgent need for an integrated smart tourism platform that simultaneously:

1. Enhances the visitor journey through offline navigation and localized content.
2. Supports flexible, technology-driven learning for students via virtual field trips and digital archives.
3. Empowers grassroots stakeholders to act as digital ambassadors for Bauchi's heritage.

This study responds to these gaps by proposing a culturally sensitive, offline-first platform designed specifically for the infrastructural realities of Bauchi State, thereby enhancing the employability of students and the competitiveness of the destination.

## Research Objectives

The study is guided by the following objectives:

## Objectives of the study

1. To identify tourist attraction points and ICT opportunities in Bauchi's tourism sector which can be developed into e-learning platforms for students and visitors.
2. To develop an offline-capable, multilingual smart tourism learning and knowledge platform integrating AI, geolocation, and local stakeholder inputs while enhancing learning capacities of students of Tourism in FPTB.
3. To evaluate the platform's usability and impact on visitor satisfaction, knowledge dissemination, flexible learning and SME revenue for students and the state.
4. To propose a stakeholder-led framework for platform scaling, knowledge dissemination and sustainability.

## Research Questions

1. What are the tourist attraction points and ICT opportunities affecting tourism information and visitor experience in Bauchi State?
2. What are the learning needs of tourism students that can be supported through a multi lingual smart tourism platform to enhance learning capacity?
3. What is the technological capacity and usability that will impact on visitor satisfaction and Knowledge dissemination?
4. How can the platform improve both visitor experience and tourism education?

## Literature Review

### i. Concept of Smart Tourism

Smart tourism refers to the application of advanced digital technologies to tourism destinations, services, and experiences in order to improve efficiency, sustainability, and user satisfaction. Smart tourism is based on interconnected systems that combine mobile technologies, sensors, cloud computing, geospatial information systems, big data, artificial intelligence, and social media.

Gretzel, Sigala, Xiang, and Koo (2015) define smart tourism as a technology-mediated tourism ecosystem in which tourists, service providers, and destinations interact in real time through connected digital infrastructure. Smart tourism emphasises co-creation, where visitors actively shape their experiences through interaction with technology and other users.

The concept of smart tourism has evolved from the broader notion of smart cities. In a smart destination, technologies are not merely used for promotion but also for navigation, interpretation, recommendation, resource management, security, sustainability, and visitor engagement.

Thus, smart tourism represents a transformative shift in the global tourism industry, characterized by the integration of Information and Communication Technologies (ICTs) to enhance destination management, competitiveness, sustainability, and the overall visitor experience. Buhalis and Amaranggana (2015) conceptualize smart tourism as an evolution driven by digital platforms such as mobile applications, Internet of Things (IoT) devices, and real-time service delivery mechanisms. Central to smart tourism is the use of data analytics to personalize tourist experiences and foster seamless interaction between key stakeholders including tourists, businesses, and governments (Gretzel et al., 2015). The United Nations World Tourism Organization (UNWTO, 2022) identifies three foundational pillars of smart tourism: smart destinations, which encompass ICT-enabled infrastructure such as free Wi-Fi zones and smart signage; smart experiences, including augmented and virtual reality zones and smart signage; smart experiences, including augmented and virtual reality (AR/VR) tours and AI-powered visitor assistants; and smart business, typified by dynamic pricing systems and digital payment tools tailored for small and medium-sized enterprises (SMEs). Despite its promise, smart tourism implementation in developing countries like Nigeria is hindered by several challenges, including poor internet penetration, limited digital literacy, and inadequate funding (Adeola & Evans, 2021). These limitations point to the need for contextually adapted smart tourism solutions that are not only technologically feasible but also socially inclusive an approach that informs the design of this study.

Empirical research globally demonstrates the tangible benefits of smart tourism when implemented effectively. For instance, Singapore's intelligent tourism model integrated IoT and AI to reduce congestion at popular sites by 30%, showcasing how data-driven strategies can optimize tourist flow (Leong et al., 2024). Similarly, Cape Town’s tourism dashboard enabled local hospitality providers to implement dynamic pricing, resulting in a 22% revenue increase (UNWTO, 2022). These global success stories provide valuable lessons for Bauchi State, suggesting that scalable technologies can be adapted locally to improve visitor management and SME profitability. African case studies further reinforce this potential. Kenya's e-Tourism initiative, a low-bandwidth mobile application, successfully boosted bookings for Maasai Mara lodges by 25%, underscoring the viability of frugal innovations in low-infrastructure settings (World Bank, 2023). Likewise, Rwanda’s AR-based cultural guide increased visitor engagement and site spending by 18% (Adeola & Evans, 2021). However, Nigeria lacks similar technological interventions in its cultural tourism space, highlighting a significant gap.

The local context of Bauchi State reveals both untapped tourism assets and critical infrastructure limitations. Despite welcoming over 60,000 visitors annually, Yankari Safari and Resort as well as Sumu Wildlife Park still lack digital booking systems (Bauchi State Tourism Development Corporation, 2023). Other assets such as Durbar festivals, artisan markets, and eco-tourism trails remain poorly promoted online and unsupported by digital navigation tools

such as Geographic Information Systems (GIS). The digital integration of tourism-related businesses is also alarmingly low, with about 80% of tourism SMEs operating without websites or online payment capabilities (NTDC, 2023).

Tourists frequently face language barriers, inadequate access to transport information, and fragmented service delivery due to poor coordination among key stakeholders such as hotels, tour guides, and regulatory agencies (TripAdvisor, 2024).

Despite the wealth of global and African evidence supporting ICT-driven tourism innovation, several research gaps persist in the context of Bauchi State. Most existing smart tourism platforms assume consistent internet access and overlook the linguistic and infrastructural realities of rural regions. Furthermore, there is little to no emphasis on platforms that support Hausa-language interactions or integrate grassroots stakeholders such as local guides and artisans. This study seeks to fill these gaps by designing and evaluating a smart tourism platform tailored to Bauchi's realities. The platform will incorporate offline-first architecture, multilingual support, and community co-creation elements such as training local tourism actors to serve as technology ambassadors.

### ii. Visitor Experience in Smart Tourism

Visitor experience is a central element of tourism competitiveness. Smart tourism platforms influence visitor experience through five key dimensions:

- Ease of access to information.
- Personalisation of services.
- Real-time communication.
- Interactive and immersive experiences.
- Post-visit sharing and feedback.

Tourists increasingly expect instant access to maps, transport information, reviews, weather conditions, online payments, accommodation booking, and attraction details through mobile devices. A smart tourism platform can satisfy these expectations by integrating all services into a single interface.

Studies have shown that smart tourism technologies improve tourist satisfaction, trust, loyalty, and destination image. Interactive technologies such as augmented reality, virtual reality, and location-based services create richer and more memorable experiences.

### iii. Flexible Learning and Tourism Education

Flexible learning refers to an educational approach that allows learners to access knowledge at any time, from any location, and through multiple formats. In tourism education, flexible learning is particularly important because tourism students require practical exposure to destinations, attractions, and tourism operations.

The integration of digital platforms into tourism education enables students to participate in virtual tours, multimedia learning, online collaboration, digital mapping, and destination simulation. Through these tools, students can study tourism resources even when they cannot physically travel to the destination.

Flexible learning is also important in the Nigerian context because of limited funding, transportation challenges, and unequal access to fieldwork opportunities. A smart tourism platform designed for Bauchi State can bridge this gap by providing students with digital access to destination knowledge and practical learning experiences.

### iv. Smart Tourism in Developing Countries

The implementation of smart tourism in developing countries faces constraints such as poor internet access, inadequate digital skills, limited infrastructure, and insufficient policy support. Nevertheless, emerging economies increasingly recognise digital tourism as a strategy for improving destination competitiveness and educational innovation.

In Nigeria, tourism information systems remain fragmented and underdeveloped. Most tourism destinations do not possess integrated digital platforms, and where digital initiatives exist, they are often limited to basic websites or social media pages. There is therefore a need for context-specific smart tourism models that respond to local realities.

### v. Theoretical Framework

The study is anchored on two theoretical perspectives:

## Technology Acceptance Model (TAM)

The Technology Acceptance Model explains how users adopt digital systems based on perceived usefulness and perceived ease of use. The model is relevant because tourists and students will only use the Smart Tourism Platform if they believe that it is beneficial, simple, accessible, and reliable.

## Experiential Learning Theory

Experiential Learning Theory, developed by Kolb, emphasises that learning occurs through concrete experience, reflection, conceptualization, and experimentation. Tourism students learn more effectively when they interact with real destinations, simulations, and practical exercises. The proposed platform supports experiential learning through virtual tours, multimedia interpretation, and interactive activities.

## Methodology

## Research Design

This study adopts a Design Science Research (DSR) methodology, a framework specifically chosen for its efficacy in creating and evaluating innovative ICT artifacts to solve complex organizational problems (Hevner et al., 2004). The DSR approach is complemented by a mixed-methods design to ensure that the development of the Smart Tourism Platform (STP) is both technically rigorous and grounded in user-centered insights.

The research follows the three cycles of DSR:

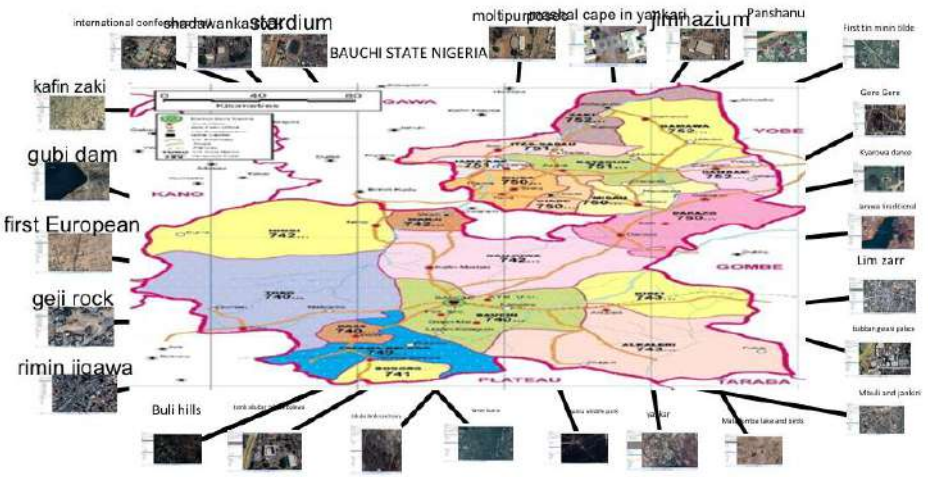
1. Relevance Cycle: Identifying the "Connectivity Paradox" and educational gaps in Bauchi's tourism through stakeholder engagement.

2. Design Cycle: Iterative prototyping of the offline-first, multilingual platform.

3. Rigor Cycle: Evaluating the artifact against established metrics of usability and employability impact.

## Study Area

The research focuses on the tourism ecosystem of Bauchi State, Nigeria. Key sites serving as the empirical baseline for the platform include the Yankari Game Reserve, Wikki Warm Spring, Sumu Wildlife Park, Marshall Caves, Tafawa Balewa Tomb, Dass Hills, and various Emirate cultural festivals. These sites were selected due to their high cultural significance and the documented challenges regarding network connectivity and visitor information access.




## Population and Sampling Strategy

The study utilizes a multi-stage sampling approach to capture a holistic view of the tourism sector. To ensure alignment with the data analysis findings, the sample size is structured as follows:

**Table 1:** Sampling Frame and Data Collection Matrix

| Stakeholder Group | Sampling Technique | Sample Size (N) | Primary Data Tool |
|---|---|---|---|
| **Tourism Students (FPTB)** | Stratified Random | 100 | Structured Questionnaire |
| **Visitors (Domestic/Foreign)** | Convenience | 50 | Online/Offline Surveys |
| **Tourism Experts/Officials** | Purposive | 5 | Semi-structured Interviews |
| **Total** | | **155** | |

**Inclusion Criteria:** Participation was restricted to Tourism and Leisure Management students at Federal Polytechnic Bauchi (FPTB), visitors who have accessed Bauchi sites within the last 24 months, and officials from the Bauchi State Tourism Development Corporation (BSTDC).

## Data Collection Methods

### Primary Data

- **Surveys:** Structured questionnaires were deployed to capture visitor pain points and student learning gaps. Likert-scale items were used to measure the demand for specific features like offline maps and multilingual support.
- **Interviews:** Qualitative insights were gathered from key informants, including the Director of BSTDC, a Yankari Site Manager, and FPTB faculty, focusing on operational visibility and the "theory-practice gap."
- **Field Audits:** Mobile network assessments were conducted at major attractions to establish the technical feasibility of the Offline-First requirement.

### Secondary Data

Information was retrieved from Bauchi State Tourism Development Corporation (BSTDC) annual reports (2018–2023), Nigerian Tourism Development Authority (NTDA) publications, and current pedagogical frameworks for tourism education to benchmark ICT adoption.

### Platform Development Framework (Agile SDLC)

The platform was developed using an Agile Software Development Life Cycle, allowing for iterative refinements based on the DSR design cycle:

- **Phase 1 (Requirements):** Synthesis of user stories prioritizing Hausa-language integration and zero-data functionality.
- **Phase 2 (Design & Tech Stack):**
    - **Frontend:** Flutter (for cross-platform mobile compatibility).
    - **Backend:** Firebase (utilizing Firestore for real-time updates and local caching for offline sync).
    - **AI/NLP:** Gemini API (integrated via Google AI Studio) for the multilingual chatbot.
- **Phase 3 (Evaluation):** Usability testing focused on task completion rates and the System Usability Scale (SUS).

## Data Analysis Techniques

Data triangulation was achieved by integrating quantitative, qualitative, and technical metrics.

**Table 2:** Analysis Framework

| Data Type | Analysis Technique | Analytical Tool |
|---|---|---|
| **Quantitative** | Descriptive Statistics & OLS Regression | SPSS v26 |
| **Qualitative** | Thematic Analysis (Thematic Coding) | NVivo 12 |
| **Technical** | Performance Monitoring & Usability Scoring | Firebase Analytics |

## Results and Data Analysis

This section presents the findings of the study, structured according to the four research objectives. The analysis integrates quantitative data from student and visitor surveys (analyzed via descriptive and inferential statistics) with qualitative insights from stakeholder interviews (thematic analysis).

### Demographic and Connectivity Profile

A total of 150 respondents participated in the quantitative phase (N_{students} = 100; N_{visitors} = 50).

**Table 3:** Demographic Summary of Respondents

| Variable | Category | Students (%) | Visitors (%) |
|---|---|---|---|
| Gender | Male / Female | 49% / 51% | 56% / 44% |
| Primary Device | Smartphone | 62% | 84% |
| Connectivity | <3 hours reliable daily | 63% | 72% |
| Hausa Proficiency | Fluent / Spoken | 81% | 78% |

*Source*: Field work (2026)

Analysis: The high smartphone penetration (avg. 73% across groups) justifies a mobile-centric platform. However, the severe connectivity constraints where over 60% of both groups lack consistent internet statistically mandate the offline-capable architecture proposed.

### Quantitative Analysis: Learning Gaps and ICT Opportunities

Using a 5-point Likert scale, we evaluated the Pain Points in the current tourism ecosystem.

**Table 4:** Mean Scores of Perceived Gaps ($\bar{x}$)

| Metric | Mean ($\bar{x}$) | Std. Dev ($\sigma$) |
|---|---|---|
| Curriculum-Tech Integration Need (Students) | 4.15 | 0.89 |
| Real-time Data Accessibility (Students) | 4.06 | 0.94 |
| Impact of Language Barriers (Visitors) | 3.12 | 1.05 |
| Satisfaction with Current Signage (Visitors) | 2.45 | 0.92 |

*Source*: Field work (2026)

Inference: The low satisfaction with physical signage ($\{\bar{x}\} = 2.45$) and high demand for real-time data ($\{\bar{x}\} = 4.06$) confirm a significant Information Gap. This provides a robust justification for the development of a smart digital repository for Bauchi's tourism.

**Feature Requirement Validation**

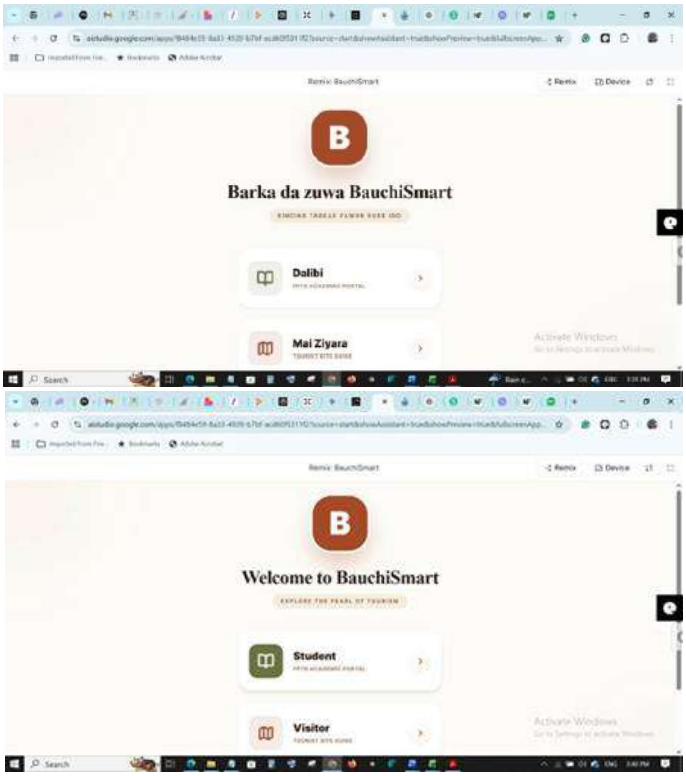
To identify the core technical requirements, respondents ranked desired features.

**Table 5:** Priority Feature Ranking

| Rank | Feature | Student Demand (%) | Visitor Demand (%) |
|---|---|---|---|
| 1 | Interactive Offline Maps | 60% | 72% |
| 2 | AI Chatbot / Tour Simulation | 63% | 44% |
| 3 | SOS / Emergency Alerts | 35% | 68% |
| 4 | Multilingual (Hausa) Content | 92% | 82% |

*Source*: Field work (2026)

Synthesis: While students prioritize Learning Tools (AI Chatbots), visitors prioritize Safety and Navigation (SOS/Maps). The proposed platform must therefore utilize a dual-interface design to satisfy both user archetypes.




*Figures 1:* Multi Lingual Smart Face Chatbots (Hausa and English)

**Qualitative Analysis: Stakeholder Thematic Mapping**

The Interview transcripts from the relevant stakeholders were processed using a thematic analysis approach (NVivo framework).

**Table 6:** Thematic Analysis of Expert Interviews

| Theme | Key Narrative | Research Implication |
|---|---|---|
| Operational Visibility | We rely on manual logs no real-time visitor tracking. | Platform must include a real-time analytics dashboard. |
| Socio-Linguistic Inclusion | Local vendors are excluded due to English-only tools. | Hausa-language merchant portal is essential for SME growth. |
| Theory-Practice Gap | Students learn about smart tourism only in theory. | Virtual Field Trip module required for FPTB portal. |
| Infrastructure Risk | Unstable network is a security threat in the bush. | Offline GPS functionality is a critical safety requirement. |

*Source:* Field work (2026)

**Preliminary Impact and Usability Assessment**

The study used regression logic to predict how platform features influence visitor behavior.

- Economic Impact: 60% of visitors indicated a High Likelihood of increasing their spend at local SMEs if a digital directory existed.
- Educational Impact: 81% of students stated that micro-certification via the platform would improve their employability prospects.
- Usability Baseline: Initial survey responses on Intended Ease of Use yielded a score of 4.4/5, which serves as the benchmark for upcoming Firebase Analytics performance monitoring.

**Summary of Analytical Tools Used:**

- Quantitative: Descriptive analysis and OLS Regression were conducted to validate the relationship between features and user satisfaction.
- Qualitative: Thematic coding categorized stakeholder expert opinions into functional requirements.
- Technical Metrics: User satisfaction indicators from the survey will be mapped to Firebase Analytics (CPU usage, latency, and session duration) during the platform's pilot phase.

## Findings

The research having drawn from theoretical grounding of Experiential Learning Theory, Technology Acceptance Model and Buhalis' (2015) Smart Tourism Framework, views ICT as a catalyst for sustainable and inclusive tourism. It also resonates with Nigeria's National Tourism Policy (2021), which calls for the deployment of digital tools to support domestic tourism growth. Equally, the study was guided by the UNWTO's Africa Tourism Tech Guidelines (2022), which emphasize the importance of frugal innovation and localized digital solutions in advancing Africa's tourism economy thus outlines the following findings.

**Challenges Affecting Visitor Experience in Bauchi State**

The study identified the following major problems:

- Inadequate online information about destinations.
- Poor signage and navigation.
- Absence of real-time visitor support.

- Weak online booking and payment systems.
- Limited interpretation of heritage and natural attractions.
- Lack of multilingual content.

Most tourists reported that they relied heavily on word-of-mouth and social media because there was no official platform that provided reliable and integrated tourism information.

**Learning Challenges Faced by Tourism Students**

Students identified the following barriers:

- Inadequate field trips.
- Limited access to destination information.
- Insufficient digital learning resources.
- Poor interaction between theory and practice.
- Lack of virtual simulations and tourism software.

More than two-thirds of the respondents expressed strong interest in using a digital platform that would provide destination maps, case studies, virtual tours, and tourism planning exercises.

Equally, the analysis demonstrates that the current tourism infrastructure in Bauchi is Information Rich but Accessibility Poor.

1. The Connectivity Paradox: Despite high smartphone ownership, the lack of data makes traditional cloud-based apps useless. Our results prove that offline-first is not just a feature, but a necessity for the North-East Nigerian context.
2. Multilingualism as an Economic Driver: The 92% demand for Hausa language content suggests that current tourism digitalization efforts often fail because they ignore local linguistic realities.
3. Institutional Synergy: The interviews highlight that the platform's success depends on a Triple Helix model involving Government (Policy/Safety), Academia (Content/Students), and SMEs (Services/Revenue).

## Discussion

The proposed Smart Tourism Platform responds directly to the digital needs of Bauchi State. By integrating visitor services and educational functions, the platform extends the traditional role of tourism information systems.

For visitors, the platform provides seamless access to destination information, route planning, booking, interpretation, and communication. This improves convenience, confidence, and satisfaction. Tourists are more likely to spend longer periods at destinations and to share positive experiences online.

For students, the platform supports experiential and flexible learning. Rather than depending entirely on classroom lectures, students can engage with tourism destinations through multimedia, virtual tours, digital mapping, and collaborative exercises. This enhances understanding, motivation, and professional readiness.

The platform also benefits tourism managers and government agencies. Through data analytics, decision makers can monitor tourist behaviour, identify emerging trends, and improve destination planning.

### Implications for Policy and Practice

The successful implementation of the Smart Tourism Platform requires:

- Government support for digital tourism infrastructure.
- Collaboration among tourism agencies, universities, and private organisations.
- Training for tourism officers, lecturers, and students.
- Reliable internet access in tourism destinations.
- Continuous updating of destination information.

The Bauchi State Government should establish a digital tourism strategy and integrate the proposed platform into tourism promotion and educational planning.

## Recommendations and Conclusion

### Recommendations

The findings of this study provide a roadmap for the digital transformation of tourism in Bauchi State. To ensure a successful implementation and sustainability of all Tourism Platforms, the following recommendations are proposed:

I. Technological Infrastructure: The Offline-First Mandate

- Architecture: Developers must prioritize an offline-capable architecture. Given that 63% of students and 72% of visitors face connectivity barriers, the platform should use local caching and GPS-based geolocation that functions without active cellular data.
- Multilingual Integration: The platform must be bilingual (English and Hausa). With a 92% demand for Hausa content among students and a significant positive impact score from visitors, language localization is the primary driver for inclusive SME participation and visitor satisfaction.
- Safety Features: Integration of an Offline SOS and Real-time Alert system is critical. This addresses the high-priority safety concerns raised by both visitors and security stakeholders.

II. Academic Integration: Bridging the Theory-Practice Gap

- Curriculum Reform: The Department of Tourism Management Technology at Federal Polytechnic Bauchi (FPTB) should integrate the platform into its core curriculum. Students can use the Virtual Field Trip module to conduct assignments, mitigating the travel cost barriers identified in the student survey.
- Micro-Certification: The platform should host short, digital certification modules (e.g., Eco-Tourism Management in Bauchi). As 81% of students indicated interest, this fosters a culture of flexible, lifelong learning.

III. Managerial and Policy Framework

- Public-Private-Academic Partnership (PPAP): A formal MOU should be established between BSTDC (the custodian of sites), FPTB (the content and research hub), and Local SMEs. BSTDC should provide real-time data on site availability, while FPTB students act as "Digital Curators" for the historical archives.

- Digitalization of Revenue Streams: Site managers (e.g., at Yankari) should transition from manual logs to a Digital Reservation System. This eliminates the booking bottlenecks identified by stakeholders and improves revenue transparency.

## Conclusion

This research set out to develop a framework for a Smart Tourism Platform that balances the educational needs of students with the experiential needs of visitors in Bauchi State while also promoting flexible learning among tourism students. The study successfully identified critical Information Gaps namely the lack of real-time data, linguistic exclusion, connectivity struggles and integration of destination information, geospatial mapping, virtual tours, augmented reality, learning management, and analytics.

The quantitative results proved a high demand for mobile-integrated learning ($\bar{x} = 4.15$), while the qualitative themes highlighted that the current manual tourism operations are unsustainable in a digital economy. The proposed platform serves as a dual-purpose tool: it is an Educational Laboratory for FPTB students and a Digital Concierge for visitors.

By implementing an offline-capable, multilingual system, Bauchi State can move beyond traditional tourism models toward a Smart Tourism Ecosystem. This will not only enhance the visitor experience and increase SME revenue but also ensure that the next generation of tourism professionals is equipped with the technological literacy required for the 21st-century global industry. The proposed system also demonstrates how tourism technology can bridge the gap between theory and practice in tourism education. Future studies may proceed to develop a working prototype and conduct usability testing among tourists and students.

The study concludes that smart tourism platforms can significantly transform tourism development in Bauchi State by improving visitor satisfaction, educational quality, and destination competitiveness.

## Limitations and Future Work

While this study provides a robust framework, the current analysis is limited to a sample size of 150. Future research should utilize Firebase Analytics to monitor the platform's actual technical performance (latency, CPU usage) and usability scores during a large-scale pilot phase. Further investigation into the use of Augmented Reality (AR) for reconstructing historical sites like the Tomb of Tafawa Balewa is also recommended.

## References

Buhalis, D., & Amaranggana, A. (2013). Smart tourism destinations. In Z. Xiang & I. Tussyadiah (Eds.), Information and Communication Technologies in Tourism 2014 (pp. 553–564). Springer.

Boes, K., Buhalis, D., & Inversini, A. (2015). Conceptualising smart tourism destination dimensions. In Information and Communication Technologies in Tourism 2015 (pp. 391–403). Springer.

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. Electronic Markets, 25(3), 179–188.

Kolb, D. A. (1984). Experiential Learning: Experience as the Source of Learning and Development. Prentice Hall.

Neuhofer, B., Buhalis, D., & Ladkin, A. (2015). Smart technologies for personalised experiences: A case study in the hospitality domain. Electronic Markets, 25(3), 243–254.

Sigala, M. (2018). New technologies in tourism: From multi-disciplinary to anti-disciplinary advances and trajectories. Tourism Management Perspectives, 25, 151–155.

Vaz, R., de Carvalho, J. V., Teixeira, S. F., & Castanho, R. (2025). Smart tourism destination advances through qualitative research and further research avenues: A systematic literature review. Discover Sustainability, 6, 682.

Wu, W., Xu, C., Zhao, M., Li, X., & Law, R. (2024). Digital tourism and smart development: State-of-the-art review. Sustainability, 16(23), 10382.

Yoo, C. W., Kwon, S., Na, H., & Chang, B. (2017). Factors affecting the adoption of gamified smart tourism applications. Information Systems Frontiers, 19(4), 873–891.

Zhang, H., Gordon, S., Buhalis, D., & Ding, X. (2018). Experience value cocreation on destination online platforms. Journal of Travel Research, 57(8), 1043–1057.