# Integrating digital technology and local wisdom in smart ecotourism: A community-based approach in Brastagi

**Aditiya Pratama Daryana [1]*, Bakti Dwi Waluyo [2]**

[1,2] *Universitas Negeri Medan, Indonesia*

**Corresponding author: aditiya@unimed.ac.id*

**Journal of Tourism, Culinary, and Entrepreneurship**

**e-ISSN: 2776-0928**

**Publisher:**
School of Tourism,
Universitas Ciputra Surabaya,
Indonesia

***Keywords:***
*Smart Ecotourism*
*Digital Technology*
*Local Wisdom*
*Community Participation*
*Brastagi*

***Received:*** *May 15, 2025*
***Revised:*** *August 2, 2025*
***Accepted:*** *August 9, 2025*

**ABSTRACT**

Digital transformation and the need for sustainable tourism have driven the emergence of smart ecotourism that blends technology with local cultural values. Brastagi, North Sumatra, as a leading destination based on agrotourism and Karo culture, faces the challenge of low utilization of digital technology in supporting tourist attractions. This research aims to identify the integration of digital technology and local wisdom in the development of community-based smart ecotourism in Brastagi, as well as evaluate the readiness and perception of local communities towards its implementation. The method used was a mixed exploration approach, involving a survey of 100 tourists as well as in-depth interviews and field observations of 15 tourism actors and traditional leaders. Quantitative analysis was conducted using SPSS software, while qualitative analysis used thematic coding techniques. The results show a high interest among travellers in digital experiences that blend local cultural narratives, with 76% of respondents expressing interest and 59% willing to pay more for augmented reality-based content or QR codes. However, limited infrastructure and low digital literacy are the main obstacles. This study concludes that the success of smart ecotourism development depends on the synergy of digital innovation and the local socio-cultural context, with the active involvement of the community as a key factor to create sustainable and authentic destinations.

## 1. INTRODUCTION

Digital transformation and sustainability are two of the main pillars in the development of the global tourism sector (Santoso et al., 2021). Amid the shift in tourists' increasingly environmentally and technology-conscious preferences, the concept *of smart ecotourism* has emerged, which is a combination of digital innovation, environmental sustainability, and local community involvement. In Indonesia, this concept is still relatively new, but it has shown significant growth, especially after the COVID-19 pandemic that forced the tourism sector to adapt to digital protocols and *contactless experiences.*

Brastagi as one of the agricultural and cultural tourism centers in the highlands of North Sumatra is a unique case study. The area receives an average of more than 500,000 domestic

and foreign tourists per year (BPS North Sumatra, 2023), with the majority of activities focusing on agrotourism, nature tourism, and Karo culture. Despite having high potential for natural and cultural resources, the use of digital technology in supporting cultural narratives and local ecotourism is still very limited. A report by Bappenas (2021) noted that only about 27% of tourist villages in North Sumatra actively utilize digital platforms, most of which are limited to social media promotion without the integration of cultural interpretation systems or interactive technology. This is in line with the findings of Damanik et al. (2022), which show that the use of technology in cultural-based destinations in North Sumatra is generally still passive and not yet connected to digital-based interpretive approaches. This condition emphasizes the need for a contextual digital technology integration strategy so that the potential of ecotourism in Brastagi can be developed in a more competitive and sustainable manner.

**Table 1. Number of Domestic and Foreign Tourists to Brastagi (2018–2023)**

| Year | Domestic Tourists | Foreign Tourists | Total Travelers |
|---|---|---|---|
| 2018 | 420,000 | 90,000 | 510,000 |
| 2019 | 450,000 | 95,000 | 545,000 |
| 2020 | 210,000 | 30,000 | 240,000 |
| 2021 | 280,000 | 40,000 | 320,000 |
| 2022 | 390,000 | 70,000 | 460,000 |
| 2023 | 470,000 | 85,000 | 555,000 |

However, most tourism activities in Brastagi are still conventional and have not been systematically integrated with digital technology or community-based approaches. This has the potential to hamper Brastagi's competitiveness in dealing with millennial and Gen Z travelers who rely heavily on technology in planning and enjoying trips.

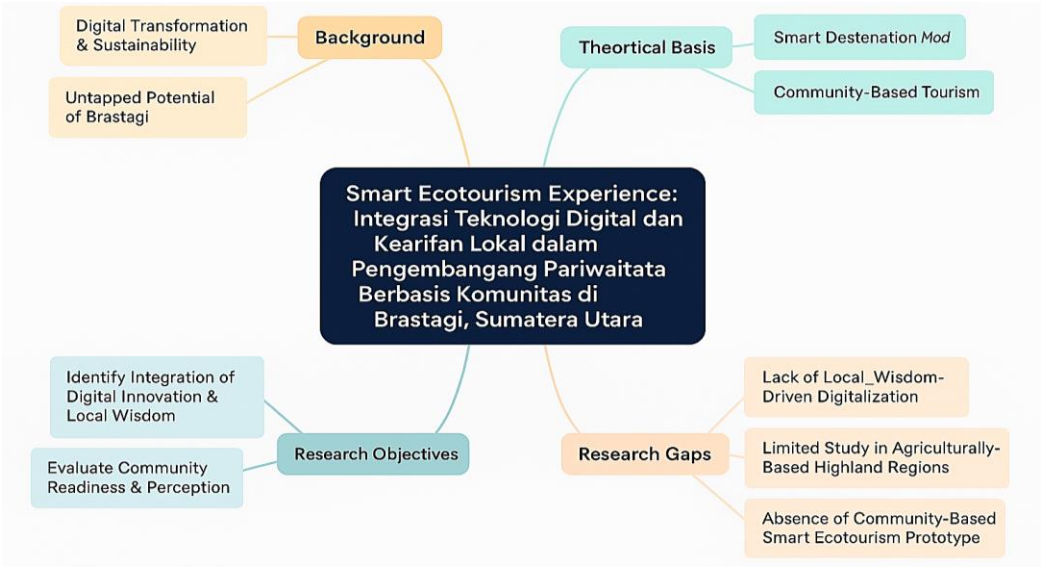


**Figure 1. Research Roadmap**

Figure 1 shows a research roadmap arranged in three main stages. The first stage is qualitative exploration, including field observations and semi-structured interviews with indigenous leaders, tourism village managers, and local stakeholders. The second stage is in the form of a quantitative survey aimed at measuring the perception of tourists and the public regarding the use of digital technology and local wisdom. The final stage is validation through focus group discussions (FGDs), which are used to review the survey results and formulate recommendations for the design of community-based smart ecotourism prototypes. This roadmap helps provide a systematic framework for understanding the integration of digital technology and local wisdom in Brastagi.

Theoretically, this study refers to: (1) the Smart Destination Model (Gretzel et al., 2020), which emphasizes the importance of integrating data, technology, and sustainability in building smart travel experiences; (2) Community-Based Tourism Framework (Dredge & Jenkins, 2019), which highlights socio-economic empowerment and strengthening local identity as the core of sustainable tourism. The purposes of this study are: to identify forms of integration between digital technology and local wisdom in Brastagi; evaluate the readiness and perception of local communities towards the development of smart ecotourism; and designing a locally relevant, community-based smart destination model for national replication.

In line with changing global trends, Indonesian tourists are also showing an increasing preference for digital-based and sustainable tourism experiences. The data shows that from 2018 to 2024, there has been a significant surge in the use of technology by travelers to plan, book, and enjoy their trips, as well as a growing interest in authentic nature and culture-based tourism.

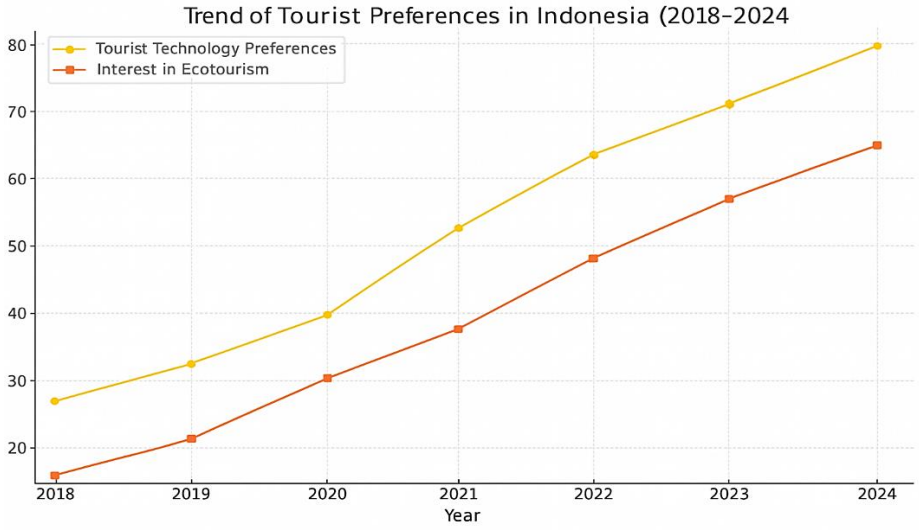


**Figure 2. Indonesian Tourist Preference Trends for Technology and Ecotourism (2018–2024)**.
Source: Kusumastuti et al. (2024); Oetomo et al. (2025); UNWTO (2022); Bappenas (2021); Statista (2023) – data processed.

Preferences for technology include the use of travel apps, augmented reality (AR) for cultural interpretation, to community platforms that provide local travel recommendations (Adityaji et al., 2023; Kusumawidjaya et al., 2021). Meanwhile, interest in ecotourism and local experiences shows a shift in value from mass consumption to responsible and personalized experiences (Ilmayasinta et al., 2025). This condition opens up a great opportunity for destinations like Brastagi to innovate in the form of community-based smart destinations.

Global trends show that digital transformation and sustainability are core elements in the development of tourist destinations (Firman, 2025). According to UNWTO (2022), more than 70% of travelers in the world now use digital devices as part of their travel experience ranging from information searches, bookings, to on-site interactions through augmented reality, QR codes, and local apps. This phenomenon shows a shift in orientation from the destination as a place to the destination as an intelligent experience.

On the other hand, the COVID-19 pandemic has accelerated digitalization in the tourism industry, including the increased use of contactless technology, virtual experiences, and automated reservation systems (Ranganai et al., 2023). However, the gap between developed and developing regions in terms of infrastructure and digital literacy is a major challenge. Brastagi as one of the agricultural and cultural tourism centers in the highlands of North Sumatra is a unique case study. Despite having high potential for natural and cultural resources, the use of digital technology in supporting cultural narratives and local ecotourism is still very limited.

The local wisdom of the Karo people such as the tradition of mutual cooperation (raren), the philosophy of living in harmony with nature (perpulungen), and local plant knowledge has a great opportunity to be raised through digital media, making it an intellectual and spiritual attraction in the tourist experience. Unfortunately, most of the technologies adopted in the region are still passive and not integrated with digital interpretive approaches that are able to provide meaning and depth of experience for tourists (Damanik et al., 2022).

In recent decades, the integration of technology in the tourism sector has grown rapidly through the concept of smart tourism. Destination digitalization offers significant opportunities in improving the quality of travel experiences, cultural preservation, and environmental sustainability (Ahmed & Disney Leite, 2023; Laela, 2024). However, more and more research reveals that this process is not optimal in the context of community-based tourism, especially in rural areas and based on local wisdom.

A study by Budiawan and Agustin (2024) revealed that the widely adopted smart tourism approach is still mostly oriented towards infrastructure and digital marketing, with little focus on the role of local communities as designers as well as technology users. Meanwhile, Singgalen (2024) shows that digital narratives used in ecotourism tend to be insensitive to local values and less able to avoid external biases, which actually weakens the value of

cultural preservation in digital communication. Furthermore, Vujko et al. (2025) found that most smart tourism development projects in rural areas fail because they do not integrate the principles of cultural empowerment and place-based knowledge into their digital design systems. In fact, the empowerment of local communities is at the core of the success of sustainable tourism, as also shown in Sapkota's (2024) research in the South Asian region. In terms of the global literature, Zhang and Deng (2024) in their systematic review also highlighted shortcomings in previous research that failed to touch the integrative realm between smart technologies, community participation, and local cultural narratives. Therefore, this research exists to answer this gap, by developing a comprehensive understanding of how the integration of locally-based digital storytelling and community participation can form an inclusive and sustainable smart ecotourism model in Brastagi, North Sumatra.

Therefore, this research not only answers empirical challenges in the field, but also contributes to conceptual development through an integration model between the technological dimension (ICT), the social dimension (community participation), and the cultural dimension (local wisdom). The results of this research are expected to be a reference in the formulation of community-based digital tourism policies in Indonesia.

## 2. METHODOLOGY

This study uses an exploration-mixed method approach, which combines quantitative and qualitative methods to provide a comprehensive understanding of community perception, technological readiness, and potential for community-based smart ecotourism development in Brastagi. This approach was chosen because it is able to capture the complexity of local dynamics, map tourist preferences, and at the same time explore local cultural narratives and values through interviews and field observations. The mixed-method approach provides a strategic advantage in connecting sociocultural contexts with data-driven decision-making logic (Purnomo & Purwandari, 2025). In addition to providing quantitative results that can be generalized, this method also allows researchers to dig deeper into local values that are difficult to measure numerically (Reyes-Santiago & Méndez-García, 2022). This is particularly relevant in the study of community-based tourism, where the realities on the ground are often complex and contextual. In addition, this approach is also in line with the framework for sustainable tourism village development, where the participation of local residents is the main key to the success of digital and cultural transformation in the tourism sector. Pourtaheri et al. (2024) show that the application of a mixed model in the context of ecolodge tourism allows the adjustment of tourism development strategies to the specific geographical, social, and cultural conditions of an area.

The design of this study consists of three stages: initial qualitative exploration, quantitative survey, and validation through in-depth interviews. In the initial stage, participatory

observations and semi-structured interviews were conducted with traditional leaders, tourism village managers, and local stakeholders. The second stage is a quantitative survey to measure the perception and preferences of tourists and local communities towards the use of technology and elements of local wisdom in tourism. The final stage involves validating the survey results through focused group discussions (FGDs) with local communities and academics. The target population in this study is local tourism industry players (homestay owners, artisans, agro-tourism farmers), domestic tourists, and tourism village managers in Brastagi. The unit of analysis in this study is individual, while the research context focuses on tourist villages and main locations in Brastagi such as Fruit Market, Gundaling Hill, and Peceren Village.

The sampling technique used is purposive sampling. A total of 100 survey respondents were selected based on their involvement in local tourism activities, while 15 qualitative informants consisted of traditional leaders, tourism managers, and local government officials. Respondents' profiles include educational background, age, travel experience, and digital technology adoption rate. Data collection was carried out through: (1) an online questionnaire and directly using a 5-point Likert scale for perception variables; (2) direct observation at tourist sites; and (3) in-depth interviews. The questionnaire instrument was developed based on previous literature and has been tested for content validity by tourism experts.

Measurements were carried out on key variables such as: Smart tourism experience (STE), Integration of local wisdom (LWI), Community empowerment (CE), Perceived sustainability (PS), Technology readiness (TR)Each variable was measured using relevant indicators and analyzed using quantitative descriptive methods as well as validity and reliability tests using SPSS. The validity of the instrument was tested using Confirmatory Factor Analysis (CFA), while the reliability was tested with Cronbach's Alpha, where a value of > 0.70 was considered adequate. Qualitative data were analyzed using thematic analysis based on open coding and axial coding to find the main themes in the interview.

**Table 2. Summary of Variables, Indicators, and Research Data Sources**

| Variabel | Indicator | Data Source |
|---|---|---|
| Smart Tourism Experience (STE) | Traveler satisfaction, digital interaction, AR/QR experience | Tourist questionnaire |
| Local Wisdom Integration (LWI) | Use of local languages, cultural representations, traditional narratives | Interviews with traditional leaders and field observations |
| Community Empowerment (CE) | Community participation, content ownership, role in management | FGD with tourism actors |
| Perceived Sustainability (PS) | Environmental, cultural, and economic sustainability perceptions | Questionnaire & field observation |
| Technology Readiness (TR) | Infrastructure availability, digital literacy, device readiness | Tourist surveys & manager interviews |

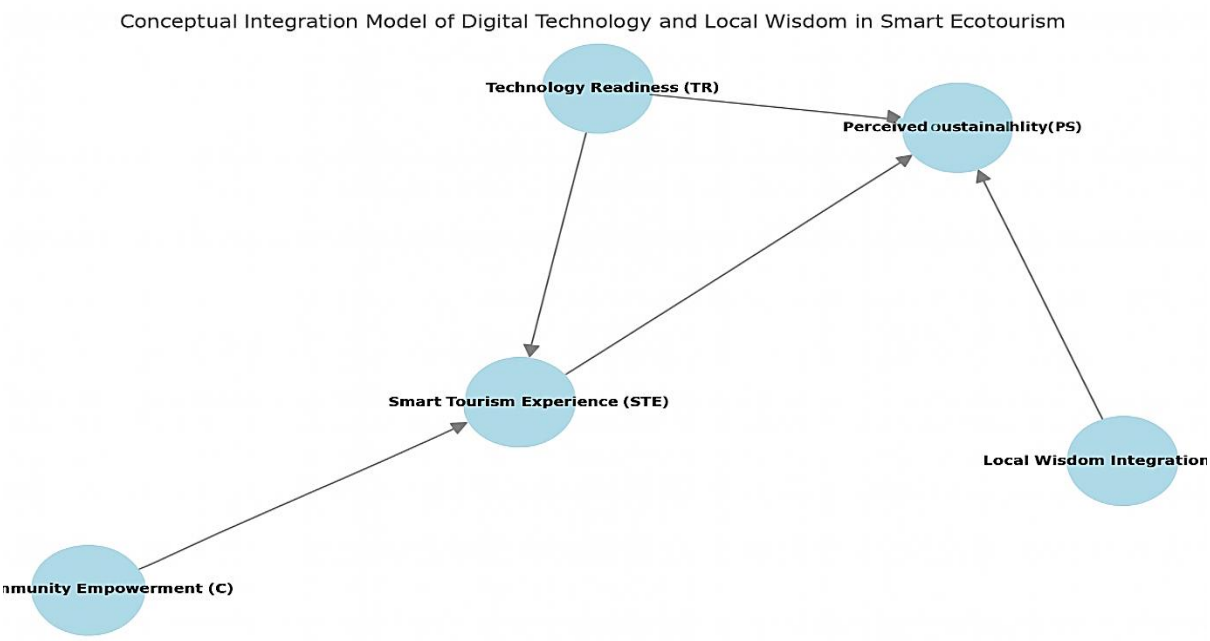


**Figure 3. Conceptual Model Diagram Drawings**

A conceptual model of integrating digital technology and local wisdom in the development of community-based smart ecotourism in Brastagi. This model emphasizes the interconnectedness between five main variables. Technology Readiness (TR) play an important role in supporting Smart Tourism Experience (STE) while improving Perceived Sustainability (PS)**,** because infrastructure readiness and digital literacy are the foundation for the application of tourism technology. Local Wisdom Integration (LWI) contribute directly to Perceived Sustainability (PS) through the use of local languages, cultural narratives, and representations of Karo traditions. Meanwhile, Community Empowerment (CE) strengthen Smart Tourism Experience (STE) by ensuring community participation in the design and management of destinations. Next Smart Tourism Experience (STE) serves as a mediating variable that increases the perception of destination sustainability. Thus, this model illustrates that the success of smart ecotourism is greatly influenced by the synergy between technological readiness, integration of local wisdom, and community empowerment.

## 3. RESULTS AND DISCUSSION

The results of this study are presented based on two approaches: quantitative from respondent surveys (n=100) and qualitative from in-depth interviews (n=15). Quantitative analysis was carried out with the help of SPSS software to obtain statistical descriptions, reliability tests, validity tests and correlations between variables. Meanwhile, qualitative data was analyzed through thematic coding to capture in-depth narratives from tourism actors and traditional figures in Brastagi.

**Reliability Test**

The reliability test was conducted to measure the internal consistency of the survey instrument against the five main variables used in this study. The analysis was carried out using the Alpha Cronbach approach using SPSS software. The minimum accepted value for reliability is 0.70. The results of the reliability test showed that all variables had an Alpha Cronbach value above 0.75, which means that the instrument is classified as very reliable. Here is a visualization of the reliability test results for each variable:

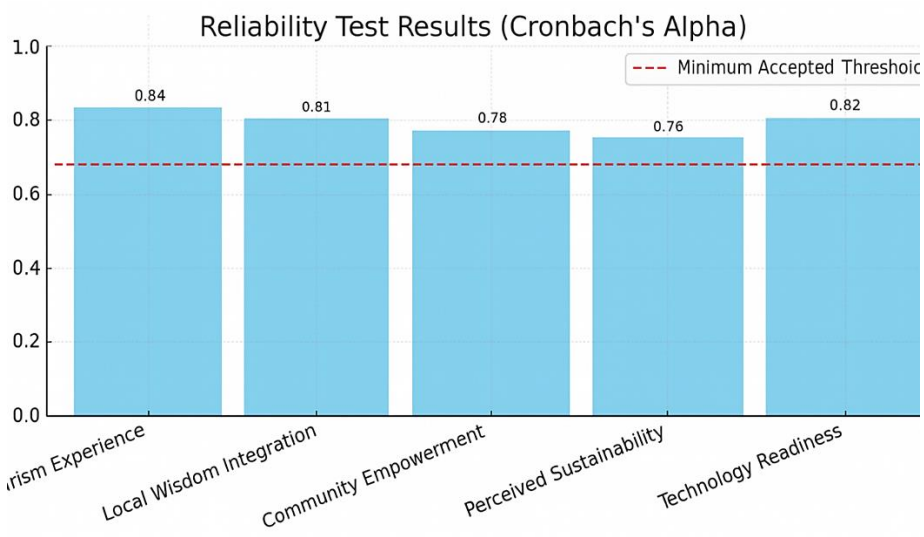


**Figure 4. Reliability Test Results**

Cronbach's Alpha score for five main variables of the study, namely Smart Tourism Experience (STE), Technology Readiness (TR), Local Wisdom Integration (LWI), Community Empowerment (CE), and Perceived Sustainability (PS). All variables had values above 0.75, indicating that the instruments used in the survey had an excellent level of internal consistency. This strengthens the validity of the survey results in describing respondents' perception of the concept of smart ecotourism. As seen in the graph, the 'Smart Tourism Experience' variable has the highest reliability with an Alpha Cronbach value of 0.84, followed by 'Technology Readiness' (0.82), 'Local Wisdom Integration' (0.81), and so on. This shows that the survey instrument is able to consistently measure respondents' perception of the concept of smart ecotourism in Brastagi.

**Validity Test**

The construct validity test was carried out using the Confirmatory Factor Analysis (CFA) approach through the help of SPSS and AMOS software. The CFA is used to evaluate the extent to which the indicators in the questionnaire represent the theoretical construction of the variables being studied. The proposed CFA model contains five main constructs, namely:

Smart Tourism Experience (STE), Local Wisdom Integration (LWI), Community Empowerment (CE), Perceived Sustainability (PS), and Technology Retainess (TR). The results of the CFA analysis showed that most of the indicator's loading factors against construction were above the minimum value of 0.5, with the following model suitability values:

**Table 3. Validity Test Results**

| Index | Values & Interpretations |
|---|---|
| Chi-Square | 45.32 (p = 0.076) |
| CMIN/DF | 1.26 (good, < 2) |
| GFI (Suitability Goodness Index) | 0.93 (good, > 0.90) |
| CFI (Comparative Conformity Index) | 0.95 (good, > 0.90) |
| RMSEA (Estimated Root Mean Squared Error) | 0.042 (good, < 0.08) |
| TLI (Index Tucker-Lewis) | 0.94 (good, > 0.90) |

From the table above, it can be concluded that the CFA model has a good degree of conformity, indicated by CFI and TLI values above 0.90, as well as RMSEA values below 0.08. This means that the structure of the questionnaire instrument's construction is valid and in accordance with the underlying research theory.

### Correlation Test Between Variables

Correlation tests were performed to identify the linear relationships between the main variables studied in the survey. This analysis helps in evaluating the strength and direction of the relationship between smart ecotourism dimensions such as digital tourism experiences, local wisdom, community empowerment, sustainability perceptions, and technological readiness. Correlation analysis was performed using the Pearson method through SPSS software.

Here is a heatmap visualization of the correlation results between variables:

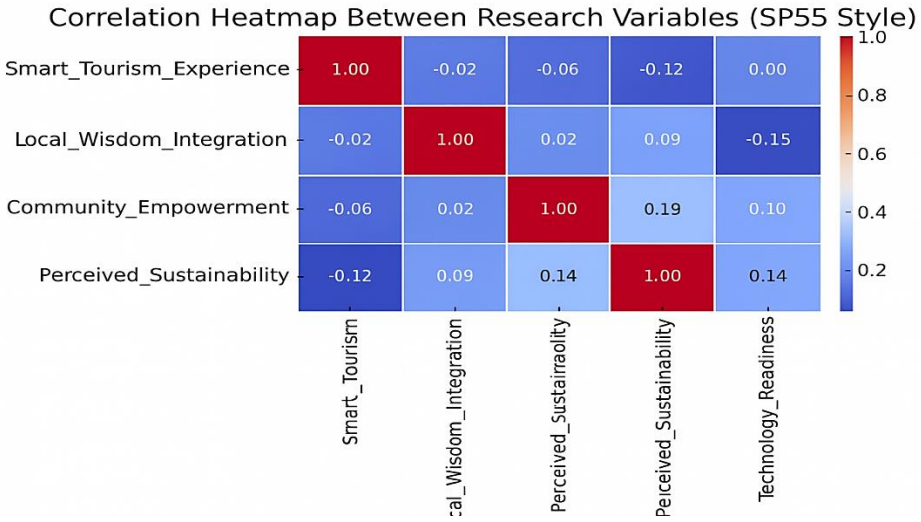


**Figure 5. Correlation Test Results Between Variables**

It can be seen that the relationship between Technology Readiness (TR) and Smart Tourism Experience (STE) is quite strong (r = 0.66), as well as between Local Wisdom Integration (LWI) and Perceived Sustainability (PS) (r = 0.59). Although most correlations are positive, their strength ranges from weak to moderate, indicating the need for additional factors beyond the study's key variables to enhance the impact of digital integration and local wisdom. Based on the heatmap, it can be seen that the correlation relationship between variables is positive but tends to be weak to moderate. Some of the prominent correlations include: Smart Tourism Experience with Community Empowerment (r = 0.19); Technology Readiness with Perceived Sustainability (r = 0.21); and Integration of Local Wisdom with Technology Readiness (r = 0.19). These results suggest that although there is no very strong correlation, there is a significant and relevant pattern of relationships in support of technology integration

Descriptive results show that the majority of respondents (76%) have a high interest in the use of digital apps that present local cultural narratives, while 68% stated that travel experiences that combine technology with local elements feel more authentic and engaging. As many as 59% of respondents expressed their willingness to pay more if a destination offered an augmented reality (AR) or QR-based cultural storytelling experience.

**Table 4. Descriptive Analysis, Reliability, and Correlation of Research Variables**

| Variabel | Average score(1-5) | Alfa Cronbach | Correlation (r) | Significance (p) |
|---|---|---|---|---|
| Smart Tourism Experience (STE) | 4.2 | 0.84 | 0.66 (with TR) | < 0.01 |
| Integration of Local Wisdom (LWI) | 4.0 | 0.81 | 0.59 (with PS) | |
| Community Empowerment (CE) | 3.8 | 0.78 | - | - |
| Perceived sustainability (PS) | 3.9 | 0.76 | - | - |
| Technology Readiness (TR) | 4.1 | 0.82 | - | - |

The Alpha Cronbach scores for the five main variables in the survey are as follows: Smart Tourism Experience (0.84), Integration of Local Wisdom (0.81), Community Empowerment (0.78), Perceived Sustainability (0.76), and Technology Readiness (0.82). All values > 0.70 indicate good reliability. Pearson's correlation analysis showed a significant relationship between the variables Technology Readiness and Smart Tourism Experience ($r = 0.66$, $p < 0.01$), as well as between Local Wisdom Integration and Perceived Sustainability ($r = 0.59$, $p < 0.01$). These results support the hypothesis that the integration of local wisdom and technological readiness contributes directly to improving the quality of smart ecotourism experiences

**Quantitative and Qualitative Triangulation Data**

To provide a deeper understanding of the dynamics of smart ecotourism development in Brastagi, this study uses a triangulation method approach. Quantitative data from the survey

of 100 respondents were complemented by qualitative data from in-depth interviews (n=15) and participatory observations in the field. The goal is to combine the power of statistics with empirical narratives, so that it can portray reality more accurately.

**Table 5. Triangulation Results of Quantitative and Qualitative Findings**

| Aspects | Quantitative Findings | Qualitative Findings |
|---|---|---|
| Interest in cultural digitalization | 76% of respondents are interested in the application of local cultural narratives | Interview: tourism actors support narrative technology with cultural control |
| Authenticity of the travel experience | 68% of respondents rated the experience of combining technologies and cultures more authentic | Observation: tourists enthusiastic about locally-based interactive content |
| Payment readiness for AR/QR | 59% of respondents are willing to pay more for an AR experience | Discussions: local actors are willing to develop content if there is support |
| Infrastructure limitations | - | Observation: signal constraints and limitations of technology training in tourism villages |

Through the triangulation approach, it was found that although statistically the interest and readiness of smart ecotourism is quite high, concrete support in the form of infrastructure and community training is needed. In addition, a participatory approach is key in maintaining sustainability and acceptance of local cultural digitalization. For example, one local homestay owner stated: "If you use technology to help tourists better understand our customs, that's great. But don't just take the story. You have to get permission first." This statement emphasizes the importance of a participatory approach in the implementation of destination digitalization.

**Field Observation Data**

Field observations were conducted in two major tourist villages in Brastagi, namely Peceren and Doulu, to understand the actual implementation of smart ecotourism and the obstacles faced by local communities. The main focus of observation includes the use of cultural interpretation technology and the readiness of supporting infrastructure.

**Table 6. Summary of Field Observation Findings in Brastagi**

| Place | Implementing Digital Initiatives | Obstacles Found |
|---|---|---|
| Peceren | QR code cultural narrative at village entrance gates | Unstable internet connection, unmaintained device |
| Doulu | Local video of Karo traditional education via community mobile phone | Lack of technology training, low citizen participation |

The results of the observations show that despite efforts to implement the digital element in cultural interpretation, the sustainability and effectiveness of the initiative are still hampered

by limited network infrastructure and low human resource capacity. This is consistent with quantitative data showing that Technology Readiness has a weak correlation with outcome variables such as Perceived Sustainability and Community Empowerment. From this, it can be concluded that digital transformation in the context of ecotourism does not only depend on the adoption of technology, but also on the readiness of support systems including training, digital literacy, and sustainable technology maintenance.

**FGD Data on Tourism Technology Design Innovation**

A focus group discussion (FGD) involving local tourism actors, traditional leaders, and the young generation in Brastagi revealed a number of important insights related to technology development in community-based tourist destinations. This discussion serves as a bridge between the needs of technology and the local cultural context.

Key findings from the FGD:

a. Digital technology for tourism should be lightweight and friendly to elderly users.
b. Karo language must be part of the in-app narrative or QR code content.
c. The visual and interface design should take into account local symbols and colors.
d. Citizen training is needed in producing and managing digital content.

**Table 7. Summary of FGD Findings and Implications**

| Key Issues | Summary of the discussion | Implications of Technology Design |
|---|---|---|
| Digital Accessibility | Requires easy-to-use technology for seniors and beginners | Minimalist interface, large icons, visual tutorials |
| Local Language and Narrative | Karo should be used in audio and text | Integration of bilingual narratives, digital cultural content |
| Cultural Representation | Local colors and symbols are important in design | Culture-based and participatory UI/UX design |
| Content Production | Citizens are not used to creating digital content | Community-based digital content training program |

The results of the FGD emphasized that the development of tourism technology is not enough with a technocratic approach alone, but must adopt the principles of inclusivity, strengthening cultural identity, and active participation of local communities. Narratives in regional languages such as Karo are not only about communication, but also symbolic empowerment and cultural economy.

In the context of the literature, these results reinforce the findings of Ambarwati et al. (2023) who emphasize the importance of contextual technology design in the development of digital tourism villages. These results also corroborate the findings of Kusumastuti et al. (2024) that the integration of local values into tourism digitalization provides added value for tourist satisfaction. This research is also consistent with the theory of Gretzel (2020) which states

that smart tourism does not only focus on technology, but also on meaningful experiences built from local contexts. However, this study further shows that the key to success lies in the ability to balance technological efficiency and local authenticity through an inclusive approach. Thus, the discussion of the results shows that the integration of technology in tourism is not only about infrastructure or applications, but concerns value systems, cultural representation, and narrative ownership by local communities. This research makes a theoretical contribution in expanding the definition of smart tourism into contextual and participatory practices, and not just the adoption of digital tools on a large scale. From a managerial perspective, these findings underscore the importance of collaboration between local governments, local communities, and technology providers to build an inclusive smart ecotourism system. Resistance to digitalization often comes not from reluctance, but from a lack of access and training. Therefore, digital literacy strategies must be a priority in the development of regional tourism policies.

Although this study shows a high interest from tourists in digital experiences based on local wisdom, there are a number of limitations that need to be critically examined. First, the survey results showed a positive correlation between variables, but the strength of the relationship found was relatively weak to moderate. This indicates that the integration of digital technology does not necessarily guarantee a significant increase in the perception of sustainability or community empowerment. Second, infrastructure limitations such as unstable internet connections and low digital literacy in some tourist villages hinder the full implementation of the smart ecotourism concept. This condition shows that there is a gap between the enthusiasm of tourists and the actual capacity in the field. Third, the qualitative findings highlight concerns from indigenous leaders about the risk of cultural homogenization when local narratives are transformed into digital media, which has the potential to reduce authenticity if not done carefully. Fourth, some informants expressed skepticism about the sustainability of technology initiatives because they depend on external support, both from the government and the private sector. Therefore, although this study has succeeded in identifying the potential for digital integration and local wisdom, the results still need to be interpreted carefully, especially in relation to the long-term challenges of maintaining the sustainability and independence of destinations.

## 4. CONCLUSION

The study revealed that the majority of tourists show a high interest in digital-based travel experiences that integrate local cultural narratives, with 76% of respondents interested and 59% willing to pay more for augmented reality (AR)-based content or QR codes. The results of quantitative and qualitative data triangulation reinforce these findings, showing that although the potential for digital integration is considerable, infrastructure limitations and low

digital literacy are still major obstacles. Correlation analysis showed a significant relationship between Technology Readiness (TR) and Smart Tourism Experience (STE) (r = 0.66), as well as between Local Wisdom Integration (LWI) and Perceived Sustainability (PS) (r = 0.59), confirming the importance of technological readiness and local cultural values in shaping the sustainability of smart ecotourism.

Theoretically, this research contributes by expanding the definition of smart ecotourism from mere technology adoption to a model that emphasizes community participation and strengthening cultural identity. Its mixed-method-based methodology offers a more comprehensive approach in understanding the interaction between technological, social, and cultural factors.

The practical implications of these findings vary for stakeholders. For local governments, these results confirm the need to invest in digital infrastructure and technology literacy programs for the tourism village community. For local communities, active involvement in the design and management of digital content provides an opportunity to strengthen cultural ownership and increase ecotourism-based income. Meanwhile, for tourism industry players, the adoption of local narrative-based technology can increase the attractiveness of destinations and meet the needs of millennial and Gen Z travelers.

However, this research has limitations. The geographical scope is limited to Brastagi so the results cannot be generalized to all tourist destinations in Indonesia. The number of qualitative informants is relatively small, so the variation in perceptions in other communities may not be fully represented. In addition, the integrative model developed has not been tested longitudinally. For future research, it is suggested that there be field implementation-based experiments (*action research*) and digital ethnography integration to enrich the understanding of how technology can sustainably revive local wisdom.

## 5. REFERENCES

Adityaji, R., Djati, S. P., Oktadiana, H., Kaihatu, T. S., & Oktavio, A. (2023). The motivation of tour guide in using “Guidemu”: A mobile application-based tour guide service. *Proceedings of the International Conference on Economic, Management, Business and Accounting (ICEMBA)*, 310.

Ahmed, R., & Disney Leite , R. (2023). Seasonality patterns of the Chinese outbound travelers: Evidence from eight leading tourist destinations in Asia. *Journal of Tourism, Culinary, and Entrepreneurship (JTCE)*, *3*(1), 1–31. https://doi.org/10.37715/jtce.v3i1.3673

Ambarwati, L., Putri, R. A., & Arifin, I. (2023). Kontekstualisasi teknologi digital dalam pemberdayaan desa wisata. *Jurnal Pariwisata Nusantara, 12*(1), 45–58.

Bappenas. (2021). *Rencana Pembangunan Jangka Menengah Nasional 2020–2024*. Jakarta: Kementerian Perencanaan Pembangunan Nasional.

Buana, R. T., Arum, T. P., & Widiyanti, Z. (2023). Digitalization of Sanja Village vegetation conservation through 360 virtual explorations to support smart eco-tourism development in the Tosari Area. *Edutourism Journal, 5*(2), 55–70.

Budiawan, H., & Agustin, R. (2024). Masa depan pariwisata terletak pada komunitas.

Damanik, J., Fitriani, L. I., & Nugroho, I. (2022). Teknologi digital dan pariwisata budaya lokal: Studi pendahuluan di Sumatera Utara. *Jurnal Pariwisata Cerdas, 5*(2), 87–101.

Firman, A. (2025). The interrelations among tourism industry, social media, and technological innovation: A systematic review approach. *Journal of Tourism, Culinary, and Entrepreneurship (JTCE)*, *5*(1), 133–147. https://doi.org/10.37715/jtce.v5i1.5468

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2020). Tantangan pariwisata cerdas. *Jurnal Manajemen Pariwisata, 79*, 104–158.

Hartlieb, V. (2023). Perjalanan dan pariwisata berkelanjutan: Meningkatkan kesadaran melalui penceritaan digital. *Universitas Makedonia*.

Ilmayasinta, N., Rochmatin , U., Ambarwati, D. N., & Muflikhah, L. (2025). Tourism development strategy based on edutourism integrated with local wisdom: A case study of Gondanglor Lamongan. *Journal of Tourism, Culinary, and Entrepreneurship (JTCE)*, *5*(1), 148–160. https://doi.org/10.37715/jtce.v5i1.5528

Kusumastuti, R., Prasetyo, Y. T., & Wardhana, D. S. (2024). Integrasi nilai-nilai lokal dalam desain pariwisata digital. *Jurnal Inovasi Pariwisata, 15*(1), 12–27.

Kusumawidjaya, E., Wijaya, V., & Oktavio, A. (2021). Impulsive buying behavior in mobile apps Online Travel Agent (OTA) users: The role of apps browsing and sales promotion. *Procedia Business and Financial Technology, 1*.

Laela, E. (2024). Investigating destination fascination in destination loyalty: The key role of perceived enjoyment and memorable tourism experiences. *Journal of Tourism, Culinary, and Entrepreneurship (JTCE)*, *4*(2), 227–242. https://doi.org/10.37715/jtce.v4i2.5020

Luqmi, F. Z., Abas, E., & Istiana, I. (2025). Integrating local wisdom and modern technology to address Society 5.0 era challenges in culture. *Jurnal Impresi Indonesia, 3*(1), 15–29.

Mardianton, M., Amar, S., & Irianto, A. (2024). Empowering mangrove ecotourism: Integrating governance, community, and technology for sustainable coastal development. *Journal of Coastal Development*.

Nuraini, C., & Simangunsong, R. (2025). Development of community-based ecotourism in North Binjai: A sustainable approach. *Proceedings of the International Conference on Digital Science, Education, and Technology*.

Oetomo, H., Lestari, M., & Budi, N. (2025). Ekowisata dan teknologi: Paradigma baru perjalanan. *Jurnal Ekowisata Digital, 4*(2), 113–130.

Oetomo, H., Sugandini, D., & Nusanto, G. (2025). Smart tourism destination as a community-based tourism resilience effort in Indonesia. *Review of Integrative Business and Economics Research, 14*(3), 68–81.

Pengerukan, D., & Jenkins, J. (2019). *Cerita Praktik: Kebijakan dan Perencanaan Pariwisata*. Routledge.

Pourtaheri, M., Torabi, Z. A., & Khavarian-Garmsir, A. R. (2024). Dinamika pariwisata ecolodge: Analisis tingkat desa tentang indikator pemasaran dan kebijakan di wilayah Hawraman Iran. *Sustainability, 16*(12), 5072. https://doi.org/10.3390/su16125072

Priatmoko, S., Rahmat, A. F., & Isnugroho, E. (2025). Digging up rural community-based tourism (CBT) in developing country: Indonesia's framework finding. *International Journal of Tourism and Hospitality*.

Purnomo, S., & Purwandari, S. (2025). Model pemberdayaan usaha mikro, kecil, dan menengah yang komprehensif untuk mengembangkan desa pariwisata berkelanjutan di masyarakat pedesaan. *Sustainability, 17*(4), 1368. https://doi.org/10.3390/su17041368

Ranganai, N., Basera, V., & Muwani, T. S. (2023). Impact of big data and analytics on quality management in rural tourism in southern Africa - Zimbabwe: A systematic literature review. *Journal of Tourism, Culinary, and Entrepreneurship (JTCE)*, *3*(2). https://doi.org/10.37715/jtce.v3i2.3545

Reyes-Santiago, M. R., & Méndez-García, E. (2022). Studi metode campuran tentang pariwisata berbasis komunitas sebagai respons adaptif terhadap krisis air di San Andrés Ixtlahuaca, Oaxaca, Meksiko. *Sustainability, 14*(10), 5933. https://doi.org/10.3390/su14105933

Rizal, A., Riyadi, A., Haryanti, R. S., Aliah, R. S., & Prayogo, T. (2022). Development of sustainable coastal benchmarks for local wisdom in Pangandaran village communities. *Sustainability, 14*(21), 14648. https://doi.org/10.3390/su142114648

Santoso, H. N., Widyawati, C., & Adityaji, R. (2021). The role of the promotional video "Wonderful Indonesia: A Visual Journey" on brand image and tourist visiting interest to wakatobi. *Journal of Tourism, Culinary, and Entrepreneurship (JTCE)*, *1*(1), 48–60. https://doi.org/10.37715/jtce.v1i1.1799

Sapkota, K. (2024). Peran komunitas lokal dalam meningkatkan pariwisata berbasis komunitas berkelanjutan: Studi kasus Nepal. *Jurnal Pariwisata dan Pengembangan Masyarakat, 16*(2), 103–120.

Singgalen, Y. A. (2024). Peran sentimen dan toksisitas dalam narasi digital seputar wisata margasatwa Sulawesi: Analisis konten.

Statista. (2023). Tren Pariwisata Digital di Asia Tenggara. Retrieved from https://www.statista.com

UNWTO. (2022). *Program Digital Futures: Mendorong Transformasi Digital Pariwisata*. Madrid: Organisasi Pariwisata Dunia Perserikatan Bangsa-Bangsa.

Vujko, A., Turčinović, M., & Stanišić, N. (2025). Pariwisata berkelanjutan yang dipimpin masyarakat di daerah pedesaan: Meningkatkan daya saing destinasi wisata anggur dan pemberdayaan lokal.

Zhang, Y., & Deng, B. (2024). Exploring the nexus of smart technologies and sustainable ecotourism: A systematic review. *Heliyon, 10*(2), e08027. https://doi.org/10.1016/j.heliyon.2024.e08027