



DIGITAL TRANSFORMATION OF HALAL TOURISM MANAGEMENT IN YOGYAKARTA OPPORTUNITIES AND CHALLENGES IN THE ERA OF INDUSTRY 4.0

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Abstract:

This study examines the digital transformation of halal tourism management in Yogyakarta in the Industry 4.0 era, focusing on the opportunities and challenges arising from the integration of digital technology into tourism services. While previous studies have generally examined digital tourism and halal tourism separately, limited research has explored their integration through a multi-stakeholder field-based perspective. This study addresses this gap by analyzing the implementation of digital technologies and the institutional challenges shaping halal tourism management in Yogyakarta. A descriptive qualitative approach with a field research design was employed. Data were collected through observation, in-depth interviews, and documentation at major tourist destinations, including Tugu Yogyakarta, Malioboro Street, Keraton Yogyakarta, Taman Sari, Kampung Cyber, Taman Pintar, and Fort Vredenburg Museum. Data were analyzed using an interactive model consisting of data reduction, data display, and conclusion drawing. The findings reveal that digital transformation has enhanced the efficiency and competitiveness of halal tourism management. Stakeholders, including local government, tourism businesses, destination managers, and local communities, have adopted digital innovations such as QRIS cashless payments, online ticketing, tourism applications, and digital marketing platforms, contributing to the development of a smart halal tourism ecosystem. However, challenges remain, including uneven digital literacy, limited technological infrastructure among small-scale enterprises, and weak inter-institutional coordination. The study concludes that strengthening human resource capacity, expanding digital infrastructure, and reinforcing collaborative governance are essential for sustainable halal tourism development. The findings provide practical implications for policymakers and tourism stakeholders in designing integrated digital tourism policies and promoting smart halal tourism destinations in Indonesia and other Muslim-friendly tourism regions.

Keywords: *Digital Transformation, Halal Tourism, Industry 4.0., Smart Tourism, Yogyakarta.*

A. INTRODUCTION

The global tourism industry is undergoing a fundamental transformation in line with the advancement of digital technologies in the Industry 4.0 era.¹ The digital revolution has reshaped the way consumers plan, book, and experience travel, creating a more integrated and responsive tourism ecosystem. In this context, halal tourism one of the fastest-growing segments requires strategic adaptation to capitalize on digitalization opportunities while addressing the increasingly specific needs of Muslim travelers.²

The global halal tourism market has demonstrated significant growth,³ with projections estimating its value to reach USD 300 billion by 2026.⁴ Indonesia, as the country with the largest Muslim population in the world, holds substantial strategic potential to become a leading halal tourism destination. However, realizing this potential requires a comprehensive digital transformation in managing of halal tourism destinations, particularly in regions with strong tourism appeal such as the Special Region of Yogyakarta.

Yogyakarta, as one of Indonesia's primary tourism destinations, possesses unique characteristics as a center of Javanese culture, an educational hub, and a region known for its high level of religious tolerance. In 2023, the Special Region of Yogyakarta recorded a total of 274 tourist attractions, including natural, cultural, artificial, and village-based tourism destinations. The total number of international tourist visits reached 511,817, while domestic tourist visits amounted to 23,563,038. These figures demonstrate Yogyakarta's ability to attract diverse tourist segments, including both

¹ Dimitrios Buhalis dkk., "Charting the progress of technology adoption in tourism and hospitality in the era of industry 4.0," *EuroMed Journal of Business* 19, no. 1 (Maret 2024): 1-20, <https://doi.org/10.1108/EMJB-11-2023-0310>.

² Nurhayati dan Julina, "Transformasi Digital Dalam Ekonomi Syariah: Inovasi Teknologi Untuk Penguatan Ekosistem Keuangan Halal di Era 5.0," *Jurnal Masharif al-Syariah: Jurnal Ekonomi dan Perbankan Syariah* 10, no. 3 (2025): 1704-14.

³ David Ruiz-Muñoz, Ana M. Sánchez-Sánchez, dan Francisca J. Sánchez-Sánchez, "Challenges and opportunities for halal tourism," *Journal of Islamic Accounting and Business Research*, advance online publication, 28 Juli 2025, <https://doi.org/10.1108/JIABR-07-2024-0276>.

⁴ Sugianto, Sastri Aida Zuhra, dan Mubarak El Alim, "Kontribusi Sektor Pariwisata Halal terhadap Produk Domestik Bruto (PDB) dalam Membangun Perekonomian Berkelanjutan," *Mutawasith: Jurnal Hukum Islam* 7, no. 2 (2024): 118-33.

domestic and international Muslim travelers.⁵ The presence of the Yogyakarta Palace (Keraton), Borobudur and Prambanan temples, as well as rich cultural traditions, provides added value for the development of authentic and sustainable halal tourism.

The advancement of digital technology has introduced a new paradigm in the tourism industry through the concepts of smart tourism and the digital tourism ecosystem. Digital platforms, mobile applications, online reservation systems, social media, and emerging technologies such as the Internet of Things (IoT), artificial intelligence (AI), and blockchain have become essential instruments in enhancing tourist experiences and improving operational efficiency in tourism destinations.⁶ In the context of halal tourism, digital technologies enable the creation of integrated information systems that assist Muslim travelers in identifying halal facilities, places of worship, prayer times, qibla direction, and various services compliant with Islamic principles.

However, the implementation of digital transformation in halal tourism presents its own complexities. Variations in halal standards across countries and certification bodies, the need for verification of the authenticity of halal products and services, and the integration of Islamic values into digital experiences pose challenges that require innovative approaches. Furthermore, disparities in technological capabilities among tourism stakeholders, limited digital infrastructure in certain areas, and the need for digital literacy among tourism actors are critical factors that must be considered in designing digital transformation strategies.

In Yogyakarta, initiatives for developing halal tourism have been initiated through various government and private sector programs, including halal certification for hotels and restaurants, the development of halal tourism packages, and promotion through digital platforms.⁷ However, these efforts remain partial and have not yet been integrated into a comprehensive digital ecosystem.⁸ Although previous studies have highlighted the role of information technology in halal tourism from a conceptual

⁵ Dinas Pariwisata DIY, *Statistik Kepariwisataaan Daerah Istimewa Yogyakarta*, 2023, 1-72.

⁶ Dodi Setiawan, "Smart Tourism: Blockchain, Artificial Intelligence Dan Internet Of Things Implementasi Dalam Industri Pariwisata 5.0," *Intelektiva* 6, no. 2 (2024): 310-17.

⁷ Sayekti Nidya Waras, "Tourism Development Strategy In Indonesia," *Academy of Strategic Management Journal* 19, no. 6 (2020): 1-8.

⁸ Ping Wang, "Connecting the Parts with the Whole: Toward an Information Ecology Theory of Digital Innovation Ecosystems," *Management Information Systems Quarterly* 45, no. 1 (Maret 2021): 397-422, <https://doi.org/10.25300/MISQ/2021/15864>.

perspective.⁹ and examined halal tourism in Yogyakarta primarily through the lenses of tourist behavior, satisfaction, and revisit intention,¹⁰ limited attention has been paid to how digital transformation is practically implemented in the management of halal tourism destinations. In particular, empirical evidence remains scarce regarding the readiness of key stakeholders, the effectiveness of digital governance, institutional collaboration, and the integration of digital technologies in destination management. Addressing this gap, the present study provides a qualitative field-based investigation of digital transformation in halal tourism management in Yogyakarta by examining the roles and interactions of government agencies, tourism businesses, destination managers, and local communities in developing a sustainable and competitive halal tourism ecosystem.

Research on digital transformation in halal tourism management has become increasingly relevant due to the acceleration of digitalization triggered by the COVID-19 pandemic.¹¹ Changes in consumer behavior marked by increased reliance on digital platforms for travel planning and booking, a growing preference for personalized tourism experiences, and heightened demand for transparency in halal information require strategic responses from destination managers. Moreover, global competition in the halal tourism industry compels Indonesia, particularly Yogyakarta, to develop competitive advantages through digital innovation.

Based on this context, this study is essential to provide an in-depth analysis of the opportunities and challenges of digital transformation in halal tourism management in Yogyakarta. Theoretically, this study contributes to the literature by integrating the concepts of digital transformation and halal tourism management into a comprehensive analytical framework that emphasizes stakeholder collaboration, digital governance, and technology adoption in destination management. Unlike previous studies that have predominantly examined digital tourism from a technological perspective or halal tourism

⁹ Hendrik Hendrik, Sri Suning Kusumawardani, dan Adhistya Erna Permanasari, "The emerging landscape of halal tourism in the digital era: an IT perspective," *Journal of Islamic Marketing* 15, no. 8 (Juni 2024): 1995-2015, <https://doi.org/10.1108/JIMA-04-2023-0130>.

¹⁰ Juliana Juliana dkk., *Revisit Intention Muslim Tourists to Halal Tourism in Yogyakarta: Analysis of Facilities, Promotion, Electronic Word of Mouth, and Religiosity*, 7, no. 1 (2024): 1-22.

¹¹ Burhan Stafrezar, "Potensi dan Tantangan Digitalisasi dalam Memajukan Wisata Halal di Indonesia: Solusi dan Implementasi," *Journal of Economics, Business, Management, Accounting and Social Sciences* 2, no. 6 (2024): 342-51.

from a tourist behavior perspective, this research offers a qualitative multi-stakeholder analysis of how digital transformation is implemented in managing halal tourism destinations. This constitutes the novelty of the study by providing empirical evidence on the interaction between government, tourism businesses, destination managers, and local communities in developing a sustainable digital halal tourism ecosystem. Practically, the findings offer recommendations for policymakers and tourism stakeholders in formulating integrated digital tourism policies and implementing effective and sustainable digital transformation strategies. Ultimately, this will enable Yogyakarta to strengthen its position as a leading digital halal tourism destination at both regional and global levels.

B. RESEARCH METHODE

This study employed a descriptive qualitative approach using a field research method to analyze digital transformation in the management of halal tourism in Yogyakarta during the Industry 4.0 era. This approach was selected to obtain a comprehensive and in-depth understanding of the opportunities and challenges associated with the implementation of digital technology in the management of halal tourism destinations. The research was conducted at eight major tourist destinations in the City of Yogyakarta, namely Tugu Yogyakarta, Malioboro, Keraton Yogyakarta, Tamansari, Kampoeng Cyber, Taman Pintar, Benteng Vredeburg, and Gembira Loka Zoo. These locations were selected based on their representativeness as leading tourist destinations and the extent of digital technology utilization in their management practices.

Data were collected through direct observation, in-depth interviews with 20 participants, consisting of 7 destination managers, 6 tourism business actors (vendors), and 7 tourists, selected using purposive sampling. Participants were chosen based on their direct involvement in or experience with the implementation and use of digital technologies in halal tourism management. Documentation, including photographs, digital applications, and online media utilized in halal tourism management, was also collected to complement the interview and observational data. These techniques were employed systematically to obtain both primary and secondary data. The qualitative data were analyzed using the interactive model of Miles, Huberman, and Saldaña, comprising data reduction, data display, and conclusion drawing. Prior to generating the findings, all interview recordings were transcribed verbatim and analyzed through a thematic

coding process, which involved open coding to identify initial concepts, axial coding to group related codes into broader categories, and selective coding to develop key themes concerning digital transformation opportunities, challenges, stakeholder readiness, digital governance, and technology adoption. To enhance the credibility and trustworthiness of the findings, source triangulation was conducted by comparing evidence obtained from observations, interviews, and documentation.

C. DISCUSSION

1. Tourism in the Special Region of Yogyakarta

The tourism sector constitutes one of the strategic pillars in regional economic development, particularly in the Special Region of Yogyakarta, which is widely recognized as a leading destination grounded in cultural, historical, and educational tourism. The dynamics of tourism in this region not only reflect the level of tourist mobility but also demonstrate the sector's resilience and adaptability to social, economic, and global changes in the post-pandemic period.

Therefore, an analysis of the development of domestic and international tourist flows is essential to understanding patterns of growth, seasonal fluctuations, and structural challenges faced by the tourism sector in Yogyakarta. Such an analysis is crucial in supporting efforts to achieve sustainable and competitive tourism development in the region.

The following presents data on the development of domestic tourist trips to the Special Region of Yogyakarta:



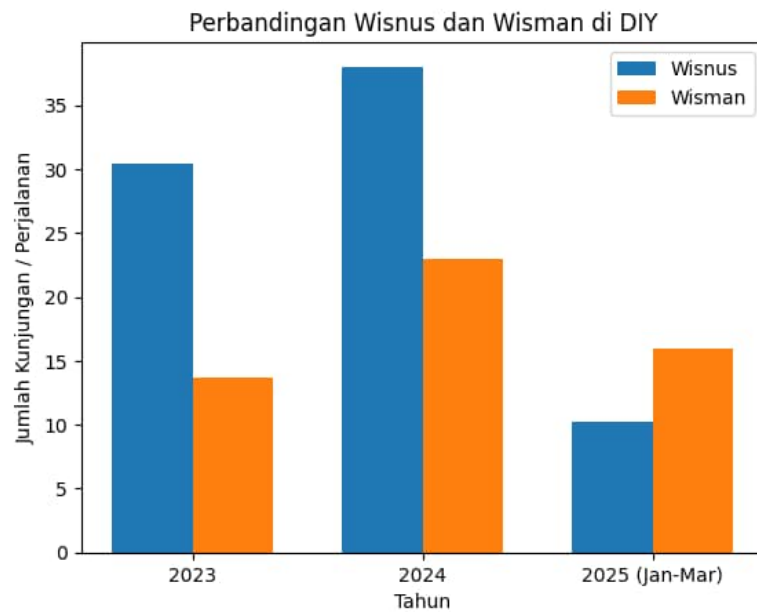
Source: Badan Pusat Statistik of the DIY for the period 2024-2025

Tourism in the Special Region of Yogyakarta (DIY) during the 2023-2025 period exhibits contrasting dynamics between domestic tourists (wisnus) and international tourists (wisman). Based on domestic travel data, the tourism sector in DIY has experienced relatively consistent growth characterized by strong seasonal patterns. In March 2025, the number of domestic tourist trips reached 3.11 million, representing an increase of 7.89 percent compared to the previous month and a year-on-year growth of 19.82 percent. This trend indicates that domestic tourism demand in Yogyakarta is in an expansion phase, driven by stable national mobility and increasing interest in cultural and recreational tourism.

From a temporal perspective, the movement of domestic tourists in DIY shows significant surges during religious holidays and year-end periods, particularly during Eid al-Fitr and the Christmas and New Year holidays. The highest peak was recorded in January 2024 with 4.27 million trips, followed by another increase in December 2024 with approximately 3.76 million trips. This pattern suggests that tourism in DIY is highly dependent on the national holiday calendar, reflecting the seasonal nature of domestic tourism. At the same time, this dependency highlights the need for sustainable tourism management strategies to mitigate extreme fluctuations across periods.

In terms of annual accumulation, the number of domestic tourist trips to DIY increased significantly from 30.44 million trips in 2023 to 38.03 million trips in 2024. In the first quarter of 2025, the total number of domestic tourist trips reached 10.24 million, marking a 3.49 percent increase compared to the same period in 2024. This achievement indicates that, despite being in the early part of the year, the performance of domestic tourism in DIY remains on a positive growth trajectory, underscoring the strategic role of domestic tourists as the primary driver of sustainability in the regional tourism sector.

The following table presents a comparison between domestic and international tourists:



In contrast to the positive trend observed in domestic tourism, the development of international tourist arrivals shows a declining tendency in early 2025. In March 2025, the number of international tourist visits was recorded at 3,185, representing a decrease of 47.68 percent on a monthly basis and 49.11 percent year-on-year. Cumulatively, the total number of international tourist arrivals during the January-March 2025 period reached 15,989 visits, declining by 30.33 percent compared to the same period in 2024. This decrease indicates that the recovery of international tourism in the Special Region of Yogyakarta has not yet been evenly achieved and remains vulnerable to various external factors, including global economic conditions, air connectivity, and geopolitical dynamics.

Overall, the data reveal a disparity in growth between domestic and international tourism in the Special Region of Yogyakarta. The strong dependence on domestic tourists has rendered the tourism sector relatively resilient in the face of global uncertainty; however, it simultaneously highlights challenges in strengthening competitiveness within the international market. Therefore, a more integrated tourism development strategy is required one that is not solely oriented toward increasing visitor numbers but also emphasizes market diversification, enhancement of destination quality, and the advancement of sustainable tourism. Such efforts are essential to ensure that tourism growth in Yogyakarta remains inclusive and sustainable over the long term.

These findings are closely aligned with the research objective of analyzing the opportunities and challenges of digital transformation in halal tourism management in Yogyakarta. The strong growth in domestic tourism presents a significant opportunity to accelerate the adoption of digital technologies, including QRIS payments, online ticketing, tourism applications, and digital marketing, to improve service quality, operational efficiency, and Muslim-friendly tourism experiences. This indicates that digital transformation has become an important driver in strengthening the competitiveness of halal tourism destinations and supporting the development of a smart halal tourism ecosystem.

On the other hand, the decline in international tourist arrivals highlights that digital transformation alone is insufficient to enhance the global competitiveness of halal tourism. The findings suggest that effective digital transformation also depends on stakeholder readiness, integrated digital governance, institutional collaboration, and international digital promotion. These results extend previous studies by demonstrating that the success of digital halal tourism management is determined not only by technology adoption but also by coordinated governance and stakeholder collaboration, thereby providing practical insights for developing sustainable halal tourism destinations.

2. Stakeholder Readiness in Halal Tourism in Yogyakarta in Adopting and Adapting to Digital Transformation in the Era of Industry 4.0

The rapid development of digital technology in the era of Industry 4.0 has brought significant changes across various sectors, including tourism. Within the context of halal tourism in Yogyakarta, stakeholder readiness constitutes a crucial factor in responding to this fast and dynamic digital transformation. Stakeholders comprising business actors, destination managers, local government, local communities, and academics demonstrate varying levels of preparedness ¹².

Some industry players have begun utilizing digital platforms such as social media, online booking websites, and halal-based service applications to promote their products and services. However, others continue to face challenges related to digital literacy, access to technological infrastructure, and the limited availability of skilled human resources in digitalization. Although training programs and

¹² Nyata Nugraha dkk., "The Role of Stakeholders in Accelerating Halal Certification for SMEs," *KnE Social Sciences* 2024 (2024): 169-80, <https://doi.org/10.18502/kss.v9i17.16321>.

technological assistance initiatives provided by government institutions and educational organizations have been increasingly implemented, their distribution remains uneven. Therefore, a comprehensive strategy is required, integrating human resource capacity building, inclusive technological infrastructure provision, and supportive policy frameworks to foster sustainable digital adoption, enabling all stakeholders to optimally adapt to the Industry 4.0 era.

Digital transformation in the Industry 4.0 era has significantly reshaped tourism management and promotion systems in Yogyakarta. Halal tourism stakeholders, including local government, tourism business actors, local communities, and academics, are required to rapidly adapt to digital technological advancements¹³. Research findings indicate that most stakeholders demonstrate a high level of awareness regarding the importance of digitalization in enhancing the competitiveness of halal tourism. This finding is supported by field interviews conducted with ticketing officers and tour guides at several major tourist destinations in Yogyakarta. The ticketing officers explained that visitors can conveniently purchase entrance tickets through digital platforms such as the Visiting Jogja application, Tiket.com, and other online travel agency (OTA) platforms, which have improved service efficiency and reduced queues at ticket counters. Tour guides also reported that tourists increasingly rely on digital applications to access destination information, navigation, and halal-friendly facilities, indicating that digital technology has become an integral part of the tourism experience. Nevertheless, this readiness varies between formal and informal sectors, depending on human resource capacity and access to technology¹⁴.

The government of the Special Region of Yogyakarta plays a pivotal role in facilitating the digital transformation of the halal tourism sector. Through the Department of Tourism, various digitalization programs have been developed, including halal tourism information portals, data-driven destination promotion, and the integration of digital payment systems in public areas¹⁵. This commitment is

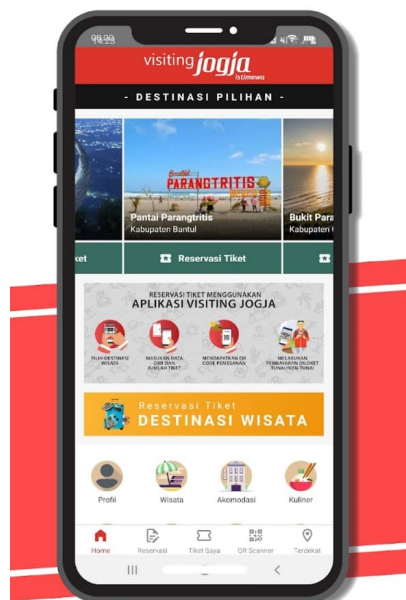
¹³ Z. Happ, É., & Ivancsó-Horváth, *Digital tourism is the challenge of future - A new approach to tourism*, 10, no. 2 (2018): 2018.

¹⁴ Interview with Mr. Suranto, Tuesday, July 15, 2025, a tour guide at Taman Sari, who was once an employee of the Yogyakarta Tourism Office, Archaeology and Fortress Section.

¹⁵ Abdul Kadir Jaelani dkk., "Artificial Intelligence Policy in Promoting Indonesian Tourism," *Volksgeist: Jurnal Ilmu Hukum dan Konstitusi* 7, no. 1 (2024): 109-37, <https://doi.org/10.24090/volksgeist.v7i1.10623>.

reflected in policies and innovations aimed at facilitating tourists' access to information related to destinations, culture, culinary offerings, and tourism events in Yogyakarta.

One tangible example of this initiative is the launch of the Visiting Jogja application, a digital platform designed to provide integrated and easily accessible tourism information services. Through this application, tourists can obtain essential information such as destination locations, activity recommendations, travel maps, and event schedules in Yogyakarta. The existence of this platform demonstrates that the local government not only focuses on the physical development of tourism destinations but also leverages digital technology to enhance service quality and improve the overall tourist experience.



Source: Image obtained from the Google Play Store for the Visiting Jogja application

Halal culinary business actors in major tourist areas of Yogyakarta demonstrate a relatively high level of readiness in adopting digital systems.¹⁶ Most vendors in Tugu Yogyakarta, Malioboro Street, and Gembira Loka Zoo have adopted QRIS as their primary payment method. In addition, they actively utilize social media platforms such as Instagram and TikTok to promote halal products. However, some small and medium-sized enterprises (SMEs) still face challenges in digital management, particularly in leveraging customer data and implementing

¹⁶ Abdul Rahman Rahim dkk., "Adaptive Strategy for Technology-Based Halal Tourism Development in Indonesia: Lessons from Singapore's Success," *International Journal of Research in Social Science and Humanities* 06, no. 06 (2025): 71-80, <https://doi.org/10.47505/ijrss.2025.6.5>.

sustainable online marketing strategies. The provision of free Wi-Fi infrastructure in Malioboro and Tugu Yogyakarta represents a concrete form of government support for the tourism digital ecosystem. Nevertheless, the study finds that inter-agency coordination requires further strengthening to ensure more effective and targeted digitalization policies.

Historical destinations such as Keraton Yogyakarta, Fort Vredeborg Museum, and Taman Sari have introduced innovations through the implementation of interactive technologies, including touchscreens, digital maps, and online ticketing services.¹⁷ Destination managers demonstrate strong readiness in leveraging technology to attract millennial tourists. The use of augmented reality (AR) in museums at the Keraton and Fort Vredeborg exemplifies the application of digital tools in delivering educational content related to Islamic history and Javanese culture. Nonetheless, further training is required for museum staff to enhance their capacity in managing digital content that is both educational and aligned with halal principles.

Digital communities such as Kampung Cyber play a significant role in fostering a digital culture within society. The involvement of local communities in managing halal tourism information strengthens regional readiness to face the challenges of the Industry 4.0 era. Kampung Cyber has even attracted attention from global figures such as Mark Zuckerberg, who recognized it as a concrete example of community-based digital literacy.¹⁸ Community participation in preserving Islamic values while embracing technological advancements serves as an indicator of social maturity within the digital halal tourism ecosystem.

The field research findings indicate that nearly all major tourist destinations in Yogyakarta have implemented digital services across various aspects of their operations. For example, digitalization at the Vredeborg Fort Museum includes the use of interactive touchscreen technology, audiovisual content, and an online ticketing system.¹⁹ Similarly, Gembira Loka Zoo has adopted electronic ticketing,

¹⁷ Anna S. Matveevskaya dkk., "Technologies of tourism in the modern urban environment," *International Journal of Civil Engineering and Technology* 9, no. 10 (2018): 1566-74.

¹⁸ Toks Dele Oyedemi, "Global digital capitalism: Mark Zuckerberg in Iagos and the political economy of Facebook in Africa," *International Journal of Communication* 13, no. August 2016 (2019): 2045-61.

¹⁹ Interview with Ms. Anita, an Education Officer, and Mr. Fajar, an Education Officer, at the Vredeborg Fort Museum, Yogyakarta, conducted on 16 July 2025.

CCTV surveillance, free Wi-Fi access, and an interactive guide application based on QR codes.²⁰ These digital transformations have improved access to information and enabled contactless transactions for visitors. Nevertheless, further efforts are required to develop more user-friendly digital services for elderly visitors and international tourists who may be unfamiliar with local digital payment systems such as QRIS.

Digital readiness is also reflected in the behavior of Muslim tourists as primary users of halal tourism services.²¹ Tourists increasingly rely on applications such as Google Maps, HalalTrip, and Traveloka (including its Sharia-compliant features) to access halal tourism information in Yogyakarta. Active participation by tourists in providing digital reviews further encourages service providers to improve quality. This phenomenon indicates that adaptation to digital transformation is driven not only by service providers but also by increasingly tech-savvy and critical consumers.

The implementation of digital technology in the halal tourism sector has generated positive impacts on management efficiency and transaction transparency.²² Through online systems, destination managers can monitor visitor numbers, revenue, and tourist satisfaction in real time. Meanwhile, business actors benefit from secure and efficient payment systems. This efficiency enhances public trust in Yogyakarta's halal tourism destinations as models of professional, accountable, and competitive tourism management. Despite these positive outcomes, the implementation of digital technology in halal tourism management continues to face several practical challenges. Field observations and interviews with destination managers, ticketing officers, and tour guides revealed that not all tourism destinations have achieved the same level of digital readiness. Several destination managers reported that

²⁰ Interview with Mr. Ade, an animal keeper responsible for animal care at Gembira Loka Zoo, Yogyakarta, conducted on 16 July 2025.

²¹ Akim Akim dkk., "The Effect of Digital Technology on the Development of Halal Tourism in Southeast Asia," *Edunity Kajian Ilmu Sosial dan Pendidikan* 2, no. 8 (2023): 861-72, <https://doi.org/10.57096/edunity.v2i8.139>.

²² Muhammad Nusran dkk., *Halal Certification in the Digital Age: Leveraging Online Platforms for Enhanced Transparency and Accessibility*-Muhammad Nusran et al. *Halal Certification in The Digital Age: Leveraging Online Platforms for Enhanced Transparency and Accessibility* 1 under , 2, no. 01 (2023): 105-15.

unstable internet connectivity and the need for continuous staff training remain significant barriers to the effective operation of digital tourism applications. These findings indicate that the effectiveness of digital transformation is influenced not only by the availability of technology but also by stakeholder capacity, supporting infrastructure, and institutional collaboration. Therefore, strengthening digital competencies, expanding technological infrastructure, and enhancing coordination among tourism stakeholders are essential to ensure the sustainable implementation of digital halal tourism management.

Each tourist destination in Yogyakarta has begun to innovate by integrating various forms of technology, including QR code-based historical information, cashless payment systems, online ticket reservations, as well as virtual tours and augmented reality (AR).²³ These innovations not only enhance the tourist experience but also strengthen the roles of various stakeholders such as local government, micro-enterprises, local communities, and destination managers in creating an inclusive and sustainable tourism ecosystem.

This collaborative approach, the application of technology serves as a strategic instrument to ensure that all services and facilities remain aligned with halal-friendly values.²⁴ This includes the provision of transparent public information, easy access to halal products, Muslim-friendly facilities, and the integration of prayer times within digital tourism systems.

Overall, digital transformation in Yogyakarta's tourism sector demonstrates significant progress, particularly in leading destinations. This indicates that stakeholders including government institutions, destination managers, SMEs, and local communities have begun adapting to the demands of the Industry 4.0 era. At least seven major tourist destinations exhibit readiness in utilizing digital technologies, thereby creating opportunities to enhance competitiveness at both national and international levels, as outlined below.

²³ I. Made Agus Kusuma Jaya, Anom Hery Suasapha, dan Hanugerah Kristiono Liestiadre, "The Influence of Acceptance of RAISA (Robots, Artificial Intelligence, And Service Automation) Technology on Intentions to Use Technology and Intentions to Visit Tourists in Bali," *Journal of Applied Science in Tourism Destination* 2, no. 1 (2024): 52-70, <https://doi.org/10.52352/jastd.v2i1.1551>.

²⁴ Budi Harsanto dkk., "Digital Technology 4.0 on Halal Supply Chain: A Systematic Review," *Logistics* 8, no. 1 (2024), <https://doi.org/10.3390/logistics8010021>.

Table 1. Digital Technology Utilization and Stakeholder Readiness in Halal Tourism Destinations in Yogyakarta

No.	Tourist Destination	Key Digital Innovation	Competitiveness Opportunity
1	Tugu Yogyakarta	QR-based information and QRIS payments	Strengthens halal city branding
2	Malioboro Street	QRIS, e-parking, public Wi-Fi	Muslim-friendly shopping destination
3	Keraton Yogyakarta	Online ticketing, virtual tours, audio guides	Promotes Islamic-Javanese heritage internationally
4	Taman Sari	online reservations	Enhances Islamic heritage tourism
5	Kampoeng Cyber	Community-based digital promotion	Model of community-based halal tourism
6	Taman Pintar	Online ticketing and digital learning media	Family-oriented halal educational tourism
7	Fort Vredeburg Museum	Digital guides and multimedia exhibitions	Modern halal cultural tourism
8	Gembira Loka Zoo	Cashless payments and digital navigation	Muslim-friendly family tourism

Source: Data processed by the researcher

3. Policies and Strategic Measures of the Local Government and Industry Actors in Optimizing Halal Tourism Development in Yogyakarta

Pursuant to Article 17A of Regional Regulation No. 1 of 2019 concerning the Amendment to Regional Regulation No. 1 of 2012 on the Regional Tourism Development Master Plan (RIPPDA) 2012-2025, the government of the Special Region of Yogyakarta has established a strategic policy direction aimed at developing a competitive, sustainable, and inclusive tourism sector. This provision emphasizes the importance of integrated and equitable destination development across the region while maintaining environmental sustainability and disaster resilience. Such policy orientation reflects the government's commitment to strengthening Yogyakarta's position as a leading national destination with global competitiveness.

Within the context of digital transformation and halal tourism, this policy framework serves as a critical foundation for promoting technology-based innovation, expanding access to halal tourism information, and fostering a Muslim-friendly

tourism ecosystem. The regional government's commitment extends beyond increasing tourist arrivals to enhancing the quality and sustainability of tourism experiences through the development of thematic tourism areas, world-class tourism products, and the regular of culinary, cultural, and sports events. These initiatives aim to strengthen regional attractiveness, support the growth of the local creative economy, and maintain a balance between tourism development, cultural preservation, and environmental protection.

The regional government also actively collaborates with Badan Penyelenggara Jaminan Produk Halal (BPJPH) and Majelis Ulama Indonesia (MUI) to accelerate halal certification processes for business actors.²⁵ This acceleration program is intended to ensure that restaurants, hotels, and souvenir products in tourist destinations obtain clear halal certification. Through the digitalization of certification registration systems, administrative processes become more efficient and transparent, thereby enhancing Muslim tourists' trust in tourism services in Yogyakarta.

In addition to certification, the government promotes the implementation of smart tourism systems across various destinations. These systems enable real-time analysis of visitor data, digital transactions, and tourist satisfaction levels. Such technologies have been applied in destinations such as Malioboro Street, Taman Sari, and Keraton Yogyakarta, with the aim of improving efficiency and service quality through data-driven tourism governance.

In terms of promotion, the Yogyakarta Tourism Office optimizes the use of social media, official websites, and digital platforms as key instruments for halal tourism campaigns.²⁶ Digital content highlighting natural beauty, local hospitality, and halal-friendly facilities enhances the attractiveness of destinations. This strategy is further strengthened through collaboration with local influencers and international Muslim communities, thereby expanding Yogyakarta's global image as a halal tourism destination.

²⁵ Redi Hadiyanto dkk., "Jaminan Produk Halal Bagi UMKM Terhadap Implementasi Program Sertifikat Halal Gratis di Jawa Barat," *Jurnal Ilmiah Ekonomi Islam* 10, no. 03 (2024): 3333-41.

²⁶ Rika Setiawati dan Generosa Lukhayu Pritalia, "Pemanfaatan Media Sosial sebagai Sarana Promosi Sektor Pariwisata," *KONSTELASI: Konvergensi Teknologi dan Sistem Informasi* 3, no. 2 (2023): 278-85, <https://doi.org/10.24002/konstelasi.v3i2.7255>.

From a regulatory perspective, the regional government reinforces policies supporting halal-oriented micro, small, and medium enterprises (MSMEs). Through relevant agencies, training programs in digital marketing, Sharia-based business management, and Islamic financial literacy are provided.²⁷ These initiatives aim to equip business actors with the necessary competencies to compete within the digital halal ecosystem, forming an integral part of local economic empowerment strategies aligned with halal principles.

Tourism industry actors, particularly in the hospitality and culinary sectors, have also undertaken strategic adjustments in response to these policies. Many hotels in Yogyakarta now provide prayer facilities, prayer mats, and qibla direction indicators in guest rooms, while restaurants increasingly offer halal-certified menus and cashless payment systems. This collaboration between public and private sectors reinforces a shared commitment to developing a professional and modern halal tourism industry.

Although digital technologies such as QRIS, online ticketing, and tourism applications have been widely adopted across major tourist destinations in Yogyakarta, the implementation of AI-powered virtual assistants or chatbot services remains limited. This indicates that digital transformation has primarily focused on transaction and information systems rather than intelligent visitor assistance. The integration of AI chatbots capable of providing multilingual information, personalized travel recommendations, halal facility guidance, and real-time customer support represents a promising direction for advancing smart halal tourism management in Yogyakarta.²⁸

A further strategic initiative involves strengthening Yogyakarta's branding as a "Halal Heritage City", emphasizing the integration of cultural, historical, and Islamic values within a framework of digital modernization.²⁹ This branding is

²⁷ Khalda Khairunnisa dkk., "Dampak Koperasi Syariah Pada Pertumbuhan Umkm Di Kota Serang : Studi Kasus Sektor Perdagangan Dan Jasa," *AB-JOIEC: Al-Bahjah Journal of Islamic Economics* 2, no. 02 (2025): 82-96, <https://doi.org/10.61553/abjoiec.v2i02.310>.

²⁸ Christian Lilik Henri Setiawan Nivak dan Bagas Dwi Rahmat, "Implementasi Chatbot Ai Sebagai Layanan Informasi Pada Website Candi Gedong Songo," *Kritits* 34, no. 1 (2024): 218-34.

²⁹ Saiful Fahmi, Kasmin Kasmin, dan Aninda Wijayanti, "Upaya Mempertahankan Place Branding Wisata Halal Pulau Lombok Sebagai Upaya Meningkatkan Kunjungan Wisatawan di Pulau Lombok," *Home Journal*. 5, no. 1 (2023): 1-11, <https://doi.org/10.61141/home.v5i1.357>.

promoted through national and international events such as Indonesia Halal Expo and Islamic Tourism Fair. Through this approach, Yogyakarta is positioned as a competitive halal tourism destination in Southeast Asia.

Moreover, the government adopts a smart regulation approach, characterized by policies that are adaptive to technological developments and evolving tourist needs. These regulations provide flexibility for innovation while ensuring compliance with Islamic principles, such as the prohibition of interest-based (riba) transactions in digital payment systems. This approach ensures a balance between innovation and adherence to Sharia values.

In line with these commitments, the government of the Special Region of Yogyakarta has implemented several key strategic policies:

- a. Tourism development in Yogyakarta is directed toward Muslim-friendly tourism as part of an inclusive strategy.³⁰ This includes providing worship facilities in public spaces and regulating business operations in accordance with Islamic values. Regional Regulation No. 12 of 2015 concerning the control and supervision of alcoholic beverages restricts their distribution and sale to maintain a conducive environment for tourists.
- b. The regional government facilitates accelerated halal certification for tourism-related businesses, particularly in the culinary and MSME sectors. This includes technical guidance, administrative assistance, and financial support, in line with Law No. 33 of 2014 on Halal Product Assurance.
- c. Strategic partnerships are established with government institutions, Islamic economic organizations, financial institutions, and private sectors to build an integrated halal tourism ecosystem. Initiatives such as the Jogja Halal Festival and the proposed Regional Committee for Sharia Economy and Finance (KDEKS) exemplify this collaborative approach.
- d. Recognizing the relatively low awareness among tourism industry actors regarding halal certification, the government emphasizes education, socialization, and technical assistance programs to encourage active participation in halal tourism development.³¹

³⁰ Nidya Waras, "Tourism Development Strategy In Indonesia."

³¹ Pambudi Priyaji Agung, *Menuju Transformasi Pengelolaan Sampah di Yogyakarta: Solusi Berkelanjutan Melalui Kolaborasi Multi-Stakeholder*, 2, no. 1 (2024): 17-32.

Overall, the policies and strategic measures undertaken by both the regional government and industry actors demonstrate a positive trajectory in advancing halal tourism in Yogyakarta. The synergy between regulation, digital innovation, and cross-sector collaboration serves as a key strength in positioning Yogyakarta as a leading halal tourism destination. By integrating Sharia principles with Industry 4.0 technologies, Yogyakarta not only adapts to contemporary changes but also contributes to innovation in national halal tourism development. This strategy is expected to enhance community welfare while strengthening Indonesia's global image as a progressive and credible hub for halal tourism.

D. CONCLUSION

Based on the findings of this study conducted across tourist destinations such as Tugu Yogyakarta, Malioboro Street, Keraton Yogyakarta, Taman Sari, Kampung Cyber, Taman Pintar, Fort Vredeburg Museum, and Gembira Loka Zoo, it can be concluded that digital transformation plays a significant role in the management and development of halal tourism in Yogyakarta. Tourism stakeholders, including local government, destination managers, and micro, small, and medium enterprises (MSMEs), have generally demonstrated a sufficient level of readiness in adopting technology through digital payment systems, online ticketing, tourism applications, and digital promotion strategies. However, challenges remain, particularly in terms of disparities in digital literacy. At the same time, Yogyakarta possesses substantial potential to evolve into a leading halal tourism destination, supported by a robust digital ecosystem, creative communities, and technology-driven smart tourism innovations. Synergy between the government and industry actors is evident in the development of halal regulations, digital infrastructure, and the provision of Muslim-friendly facilities. Nevertheless, further efforts are required to strengthen digital literacy, enhance support for halal-oriented MSMEs, and reinforce the global branding of "Yogyakarta Halal Tourism."

Theoretically, this study contributes to the halal tourism literature by integrating the perspectives of digital transformation and halal tourism management through a qualitative multi-stakeholder approach. The findings demonstrate that the success of digital transformation depends not only on technology adoption but also on stakeholder collaboration, digital governance, and institutional readiness, thereby extending existing studies that primarily emphasize technological innovation or tourist behavior. However, this study is limited to major tourist destinations in Yogyakarta and employs a

qualitative design, which may limit the generalizability of the findings to other regions. Future research is recommended to adopt comparative or mixed-method approaches involving different halal tourism destinations in Indonesia or Southeast Asia and to examine the role of emerging technologies, such as artificial intelligence, big data analytics, and smart tourism platforms, in strengthening the sustainability and global competitiveness of halal tourism.

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