The Role of Artificial Intelligence (AI) in Accelerating, Ensuring Compliance, and Promoting Inclusivity in the Development of Halal Tourism in Indonesia

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ABSTRACT

This study explores the role of Artificial Intelligence (AI) in accelerating, ensuring compliance, and promoting inclusivity within the development of Indonesia's Halal Tourism sector. Grounded in the framework of the Master Plan for Indonesia's Halal Industry (MPIHI) 2023–2029, this research adopts a qualitative-descriptive method supported by policy and literature analysis. The study identifies AI as a critical driver of transformation across both the demand and supply sides of Halal Tourism. On the demand side, AI facilitates personalized and sharia-compliant travel experiences through adaptive recommendation systems, chatbots, and sentiment analysis. On the supply side, AI enhances operational efficiency and Halal Assurance through predictive analytics, blockchain-based traceability, and automated Halal auditing systems. Findings indicate that AI integration significantly strengthens trust infrastructure, scalability of certification, and inclusivity of micro- and small-scale tourism enterprises. However, challenges remain in digital literacy, infrastructure disparity, and regulatory readiness. The study concludes that inclusive digital governance and a Halal AI Governance Framework are essential to ensure ethical, equitable, and sustainable adoption of AI in Indonesia's Halal Tourism ecosystem.

Keyword : *Artificial Intelligence, Halal Tourism, Compliance, Inclusivity, Indonesia*

Introduction

Indonesia, as the country with the largest Muslim population in the world, reaching 87.1% of the total population in 2023, or around 248.37 million people, has a unique demographic advantage in developing the concept of Muslim-Friendly Tourism or Halal Tourism (Wulandari et al., 2025). The tourism sector in general has long been a strategic pillar, contributing significantly to the Gross Domestic Product (GDP), foreign exchange, and job creation. The development of Halal Tourism in Indonesia is reflected in the government's strategic plan, which is to improve the welfare of the community by opening up business opportunities, realizing sustainable tourism development, and increasing tourist satisfaction (Siregar et al., 2024).

Indonesia's long-term vision, as outlined in the 2023–2029 Indonesian Halal Industry Master Plan (MPIHI), is to make the country the World Center for the Halal Industry (Azwar & Usman, 2025). To achieve this ambitious target, the Halal Tourism

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sector has been designated as a Core Halal Industry. The government is targeting halal tourism to contribute more than 3% to the national GDP by 2029, which in turn is expected to create millions of new jobs in the tourism and creative economy sectors (bin Lahuri & Purnamasari, 2024).

Achieving these massive quantitative targets requires a leap in capacity and efficiency that goes beyond conventional operational methods. Strategic analysis indicates that Artificial Intelligence (AI) is a key accelerator that is needed. When rapid growth is pursued, manual operations and fragmented services tend to limit scale and quality. Only through AI-based efficiency, from service personalization to verifiable Sharia compliance assurance, can the economic potential of Indonesia's Halal Tourism be fully unlocked (Irawan, 2023). Thus, AI is not merely a technological tool, but a crucial economic lever to ensure that massive growth remains sustainable and sharia-compliant, making it a national strategic priority.

Halal tourism is defined as activities supported by various universal facilities and services, but still in line with the sharia values contained therein (Siregar et al., 2024). Muslim tourists are a unique market segment. Their travel motivations are not only centered on recreational and relaxation experiences, but also demand that these experiences reflect their religious values (Ririn Tri Ratnasari, 2023). They seek destinations that provide innovative solutions to meet their spiritual needs without obstacles, such as the availability of halal food and beverages, access to places of worship, and adequate privacy (Hakim et al., 2023).

In a global context, the criteria of family-friendly tourism and safe travel destinations are strongly emphasized (Wulandari et al., 2025). The application of AI for risk management and destination security, both physical security and data security, has a direct relationship with increasing Indonesia's global competitiveness. In addition, this fulfills the universal principle of Islam regarding the preservation of life (*Hifz al-Nafs*) and possessions (*Hifz al-Mal*) (Stafrezar, 2024).

Halal tourism is a concept that ensures tourism services and facilities do not conflict with sharia principles. Muslim tourists tend to have specific preferences, such as the availability of halal-certified food, ease of worship, safety, and a comfortable environment (Hakim et al., 2023). Meeting these needs requires ensuring the integrity of services throughout the tourism value chain, from transportation, accommodation, and culinary experiences to destination activities. However, conventional systems for managing halal tourism often face challenges such as limited audit capacity, data fragmentation, and imbalances in digital infrastructure between regions (Hendrik et al., 2024).

In the context of national digital transformation, Artificial Intelligence (AI) offers great potential to overcome these obstacles (Battour et al., 2022). AI can improve service quality through personalized travel recommendations, automated customer service, and real-time halal facility navigation features. At the operational level, AI enables efficient destination management, optimization of the halal supply chain, and increased speed and accuracy of the halal certification process through automated document analysis and risk detection. The integration of AI with other technologies such as the Internet of Things (IoT) and Blockchain also opens up opportunities for the creation of a transparent and secure digital halal assurance system (Melly Wanda Ismi Wulandari & M. Ruslianor Maika, 2025).

However, the use of AI in Indonesia's halal tourism still faces a number of obstacles. Inequalities in access to digital infrastructure, low technological literacy among tourism MSME players, and the absence of a specific regulatory framework for AI governance based on sharia principles are challenges that need to be overcome. The application of advanced technology without inclusive policies risks deepening regional disparities and hindering the achievement of equitable and fair halal tourism development targets. Therefore, technological innovation must be accompanied by strategies to strengthen human resource capacity, integrate national data, and establish an ethical and regulatory framework for AI that is in line with Islamic values.

Given this urgency, studies on the role of artificial intelligence in accelerating, ensuring compliance, and expanding the inclusiveness of halal tourism are highly relevant. A comprehensive understanding of AI integration in the halal tourism ecosystem is expected to contribute to policy development, increase destination competitiveness, and strengthen Indonesia's position as a global leader in the technology-based halal tourism industry.

Method

This study uses a descriptive qualitative research method to examine the role of artificial intelligence (AI) in accelerating, ensuring compliance, and promoting inclusivity in the development of halal tourism in Indonesia. This method was chosen because it allows for in-depth exploration of the policy context, technological developments, and the dynamics of digital implementation in the halal tourism ecosystem. The research focuses on synthesizing conceptual frameworks, policy documents, and empirical findings from various previous studies to produce a comprehensive understanding of AI's contribution to the transformation of the halal tourism sector (Hasanah, 2017).

The participants in this study are not human subjects, but rather a collection of relevant documents and text sources. The data corpus includes national policy documents such as the 2023–2029 Indonesian Halal Industry Master Plan (MPIHI), regulations from ministries related to halal tourism, official reports from BPJPH and Kemenparekraf, and scientific publications discussing the application of AI, smart tourism, and halal supply chain systems. The sources were selected purposively based on relevance, credibility, and recency so that the analysis reflects the actual conditions of AI technology implementation in halal tourism.

Data collection was conducted through systematic document analysis, including the processes of identification, review, and extraction of information from government policies, institutional reports, journal articles, and credible digital publications. This procedure followed the standard stages of document research, namely the selection of relevant documents, verification of authenticity and feasibility, and recording of important information through structured reading notes. The document analysis method used is well-established in qualitative research, so this study does not modify commonly used procedures. The documents analyzed are limited to the period relevant to the implementation of halal tourism and digital transformation to maintain the accuracy of the findings.

Data analysis was conducted using thematic analysis techniques in accordance with the interpretive stages of qualitative research. The first stage involved data reduction, which consisted of identifying and filtering information related to AI adoption, halal assurance mechanisms, policy directions, and digital ecosystem challenges. The reduced data was then coded into thematic categories, including demand-side service personalization, supply-side operational efficiency, digital governance, and AI-based compliance systems. Each theme was compared across sources to identify patterns, inconsistencies, and implementation gaps. The final stage involved synthesizing all themes into an analytical narrative explaining the strategic contribution of AI to the development of halal tourism in Indonesia. All stages of the analysis followed established thematic analysis procedures in qualitative methodology without technical changes (Heriyanto, 2018).

Results

This study shows that the use of artificial intelligence (AI) has strategic potential in accelerating, strengthening compliance, and increasing inclusivity in the development of halal tourism in Indonesia. AI fundamentally changes the interaction between tourists and

destinations, shifting from generic services to highly personalized experiences that directly support the spiritual needs and comfort of Muslim tourists.

Adaptive Halal Recommendation Engine and Sharia-Compliant

AI has the ability to analyze travelers' preferences, including their spiritual needs and Islamic lifestyle, to provide safer and more personalized travel solutions (Irawan, 2023). Machine Learning (ML) enables more sophisticated market segmentation, going beyond standard demographics to understand the psychographic motivations of Muslim travelers who demand a balance between recreation and religious values (Ririn Tri Ratnasari, 2023).

In the context of applications, AI can provide real-time information about halal facilities around destinations and even present more in-depth visual content about local culture (Azwar & Usman, 2025). In addition, technologies such as ChatGPT have been proven to increase the satisfaction of Muslim tourists by providing direct support tailored to their needs, which ultimately encourages repeat visits and electronic promotion (*e-Word-of-Mouth*) (Arif, 2019).

Although there are already many apps that provide basic features for worship needs, such as Muslim Pro, Athan, and Umma (which offer prayer schedules, qibla direction indicators, and the Quran) (Rohmawaty, 2023), AI enables the integration of location data and prayer times into broader tourism recommendation engines. Digital platforms such as "Halal Tripnesian" have innovated to facilitate access to information on mosques, halal restaurants, hotels, and halal products, demonstrating the enormous potential of digital platforms oriented towards sharia compliance.

Automated Customer Service (Halal Chatbots and Virtual Assistants)

The use of chatbots is an increasingly widespread application of AI in the travel industry. Chatbots are designed to simulate direct conversations with humans, making it easier for tourists to exchange information about tourist attractions (Andri Sahata Sitanggang et al., 2025). In Halal Tourism, chatbots function as 24-hour information providers that can give recommendations on destinations, accommodations, and culinary experiences tailored to travelers' preferences (Laja et al., 2025).

Local case studies in Indonesia have proven the feasibility and effectiveness of this technology. The implementation of Machine Learning Framework-based chatbots such as RASA in Pekalongan and Semarang shows a high level of model accuracy (0.91 accuracy, 0.97 precision, and 0.95 F1 score in Semarang). This performance proves that chatbot technology is ready to be scaled nationally.

For micro and small tourism businesses (MSMEs), AI-based Virtual Assistants offer a solution to save on operational costs and reduce the intensity of physical contact with officers, while still providing professional services throughout the day. The main goal of AI on the demand side is to create a "frictionless faith experience." AI eliminates the uncertainty and stress often experienced by Muslim tourists in foreign locations regarding the fulfillment of religious requirements (e.g., finding certified halal food or the accurate direction of the qibla). This high level of comfort directly increases satisfaction, encourages repeat visits, and strengthens Indonesia's image as a global Muslim-friendly destination.

Smart Digital Marketing and Sentiment Analysis

In marketing, AI is used to analyze big data in order to monitor public perception and understand market trends, particularly through Sentiment Analysis. Indonesia and Malaysia are at the forefront of research on AI and the halal industry, with Big Data and Sentiment Analysis being key research themes (Azwar & Usman, 2025).

The use of AI includes: 1) Targeted market segmentation, such as countries of the Organization of Islamic Cooperation (OIC); and 2) Translation of tourism content—from descriptions and reviews to travel guides—into various languages, effectively removing

communication barriers for international Muslim tourists. Although many applications focused on Muslim needs have been developed, data on tourist behavior, location, and certification status often remains fragmented. If data from these various sources is not efficiently integrated into a single platform that can be analyzed by AI (such as a National Data Lake), personalization capabilities will remain limited. This data fragmentation hinders Indonesia's ability to maximize its data assets in strategic policy formulation and destination planning.

In terms of acceleration, AI has proven capable of improving operational efficiency through service automation, destination management optimization, and the provision of personalized travel recommendations for Muslim tourists. This technology is also capable of strengthening cross-agency data integration, thereby supporting the implementation of a smart halal tourism concept that is more responsive and adaptive to market dynamics.

In terms of compliance, AI plays an important role in supporting the halal assurance system through faster document analysis, identification of potential risks, and integration with IoT and Blockchain technologies that strengthen the transparency of the halal supply chain. Thus, AI helps minimize human error, speeds up the certification process, and improves the accuracy of sharia compliance monitoring at every stage of tourism services.

Meanwhile, in terms of inclusivity, AI opens up opportunities for the equitable distribution of halal tourism benefits by improving access to information, providing disability-friendly navigation systems, and helping tourism MSMEs access artificial intelligence-based digital platforms. This innovation has the potential to reduce the digital divide between regions and provide greater opportunities for new destinations to develop.

However, this study also identifies challenges such as digital infrastructure inequality, low technological literacy at the MSME level, and the absence of a regulatory and ethical framework for AI based on sharia principles. Therefore, the successful integration of AI requires comprehensive policy support, cross-institutional collaboration, and human resource capacity building to ensure that the digitalization of halal tourism is sustainable and equitable.

Overall, AI is an important catalyst for the transformation of Indonesia's halal tourism, but its implementation must be accompanied by clear governance, based on sharia values, and oriented towards inclusiveness. Strategic integration between technology, policy, and human capacity building is key to making Indonesia a global leader in the development of technology-based halal tourism.

Discussion

The results of the study show that the use of Artificial Intelligence (AI) has a strategic contribution in accelerating the transformation of halal tourism in Indonesia. In terms of acceleration, AI has been proven to improve service efficiency, optimize destination management, and facilitate data-driven decision making. Technologies such as machine learning, chatbots, intelligent recommendation systems, and predictive analytics enable Muslim tourists to obtain a more personalized, faster, and sharia-compliant travel experience. This digitization process is in line with the national objectives of the 2023–2029 Indonesian Halal Industry Master Plan (MPIHI), which emphasizes the need for innovation and technology integration to strengthen the competitiveness of Indonesian halal products and services. Improvements in service speed and user experience are key factors in accelerating the growth of this sector.

In terms of compliance, AI can strengthen the halal assurance system through automated monitoring, increased verification accuracy, and continuous monitoring of the halal supply chain. The integration of AI with supporting technologies such as the Internet of Things (IoT) and Blockchain has the potential to create a Halal Assurance System that is more transparent, auditable, and minimizes human error. In the context of halal certification, AI can accelerate the document analysis process, scan for potential non-halal

risks, and provide early warnings to industry players. This not only improves the administrative efficiency of BPJPH and related institutions, but also strengthens public trust in the halalness of tourism products and services. Thus, AI serves as a reinforcement of accountable and measurable halal governance.

The aspect of inclusivity is also an important finding. AI opens up opportunities for the equitable distribution of the benefits of halal tourism by providing digital access to previously underserved areas. AI-based platforms can help halal tourism MSMEs increase visibility, improve service quality, and gain a deeper understanding of market needs through data analytics. For tourists with disabilities, AI also facilitates accessibility through speech-to-text technology, navigation assistance, and AI-driven accessibility features. Thus, AI integration provides opportunities for halal tourism to not only grow economically but also reach a wider and more diverse group of users.

Although these opportunities are significant, this study also reveals a number of challenges that hinder the optimization of AI's role in halal tourism. Digital infrastructure inequality between regions is a major obstacle, especially in halal tourist destinations located in rural areas or 3T regions. The digital literacy of tourism SME actors is also still low, which affects their level of readiness to adopt technology. In addition, the absence of a nationally standardized AI governance framework, especially one that complies with sharia principles, has the potential to raise issues of ethics, data security, and value incompatibility. These challenges indicate that the successful integration of AI depends not only on technological aspects, but also on the readiness of human resources, regulations, and institutional collaboration.

Overall, this study shows that AI has a multi-dimensional role in the development of halal tourism, including accelerating services, ensuring halal compliance, and expanding the inclusiveness of the sector. However, its successful implementation requires synergy between the government, academics, industry players, and halal certification agencies. Adaptive policy formulation in response to technological developments, strengthening the digital capacity of MSMEs, and providing equitable technological infrastructure are prerequisites for the creation of a sustainable AI-based halal tourism ecosystem. With collaborative efforts, Indonesia has a great opportunity to become a global center of excellence for halal tourism based on technological innovation.

Conclusion

This study shows that the use of artificial intelligence (AI) has strategic potential in accelerating, strengthening compliance, and increasing inclusiveness in the development of halal tourism in Indonesia. In terms of acceleration, AI has been proven to improve operational efficiency through service automation, destination management optimization, and the provision of personalized travel recommendations for Muslim tourists. This technology is also capable of strengthening cross-agency data integration, thereby supporting the implementation of a smart halal tourism concept that is more responsive and adaptive to the dynamics of market needs.

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References

Andri Sahata Sitanggang, Irsan Ahmad Syawali, Andri.sahata@gmail.unikom.ac.id, Fauzan Zaki Sholih, Muhammad Alwizard, & Albertus Aris Nauw. (2025). Peran Chatbot Artificial Intelligence (AI) sebagai Teman Virtual: Literature Review. *Neptunus: Jurnal Ilmu Komputer Dan Teknologi Informasi*, *3*(3), 219–228. https://doi.org/10.61132/neptunus.v3i3.992

Arif, M. E. (2019). THE INFLUENCE OF ELECTRONIC WORD OF MOUTH (EWOM), BRAND IMAGE, AND PRICE ON RE-PURCHASE INTENTION OF AIRLINE CUSTOMERS. *Jurnal Aplikasi Manajemen*, *17*(2), 345–356. https://doi.org/10.21776/ub.jam.2019.017.02.18

Azwar, A., & Usman, A. H. (2025). Artificial intelligence in the halal industry: Trends and global research opportunities. *International Journal of Halal Industry*, *1*(1), 46–67.

Battour, M., Mady, K., Elsotouhy, M., Salaheldeen, M., Elbendary, I., Marie, M., & Elhabony, I. (2022). Artificial Intelligence Applications in Halal Tourism to Assist Muslim Tourist Journey. In M. Al-Emran, M. A. Al-Sharafi, M. N. Al-Kabi, & K. Shaalan (Eds.), *Proceedings of International Conference on Emerging Technologies and Intelligent Systems* (Vol. 322, pp. 861–872). Springer International Publishing. https://doi.org/10.1007/978-3-030-85990-9_68

bin Lahuri, S., & Purnamasari, F. W. (2024). Kajian Kritis Literasi Halal dalam Pariwisata: Penyelenggaraan Biro Perjalanan Berdasarkan Fatwa DSN-MUI No. 108/2016. *Innovative: Journal Of Social Science Research*, *4*(5), 2380–2394.

Hakim, M. L., Hanif, N. A., & Prasetyo, S. (2023). PENGEMBANGAN SEKTOR PARIWISATA HALAL MELALUI SMART TOURISM DI INDONESIA DAN DUBAI. *The Indonesian Journal of Public Administration (IJPA)*, *9*(2), 66–76. https://doi.org/10.52447/ijpa.v9i2.7348

Hasanah, H. (2017). TEKNIK-TEKNIK OBSERVASI (Sebuah Alternatif Metode Pengumpulan Data Kualitatif Ilmu-ilmu Sosial). *At-Taqaddum*, *8*(1), 21. https://doi.org/10.21580/at.v8i1.1163

Hendrik, H., Kusumawardani, S. S., & Permanasari, A. E. (2024). The emerging landscape of halal tourism in the digital era: An IT perspective. *Journal of Islamic Marketing*, *15*(8), 1995–2015.

Heriyanto, H. (2018). Thematic Analysis sebagai Metode Menganalisa Data untuk Penelitian Kualitatif. *Anuva: Jurnal Kajian Budaya, Perpustakaan, dan Informasi*, *2*(3), 317–324. https://doi.org/10.14710/anuva.2.3.317-324

Irawan, B. (2023). Impact of Artificial Intelligence on the Tourism Industry: A Literature Review. *Innovative: Journal Of Social Science Research*, *3*(6), 4865–4878.

Laja, Y. P. W., Delvion, E. B. S., & Siahaan, M. M. L. (2025). Chatbot Artificial Intelligence (AI) to Supporting Differentiated Mathematics Learning. *Jurnal Pendidikan MIPA*, *26*(1), 118–130. https://doi.org/10.23960/jpmipa.v26i1.pp118-130

Melly Wanda Ismi Wulandari & M. Ruslianor Maika. (2025). Penerapan Artificial Intelligence dan Machine Learning dalam Sektor Pariwisata Halal: Tinjauan Bibliometrik. *Al-Kharaj: Jurnal Ekonomi, Keuangan & Bisnis Syariah*, *7*(5). https://doi.org/10.47467/alkharaj.v7i5.7350

Ririn Tri Ratnasari, -. (2023). *OTOMATISASI PENGEMBANGAN PARIWISATA HALAL BERBASIS TEKNOLOGI ARTIFICIAL INTELLIGENCE* [Pidato Guru Besar]. http://www.lib.unair.ac.id

Rohmawaty, E. N. (2023). *EFEKTIFITAS APLIKASI AL-QUR'AN (MUSLIM PRO) TERHADAP KEMAMPUAN MEMBACA AL-QUR'AN MAHASISWA IAIN KEDIRI*.

Siregar, M. R., Fuadi, F., Ichsan, I., Dharma, Y., & Nur, M. M. (2024). Analysis of The Implementation of Halal Tourism Destination Development as an Effort to Improve The Economy of Banda Aceh City. *Syarah: Jurnal Hukum Islam Dan Ekonomi*, *13*(2), 211–224. https://doi.org/10.47766/syarah.v13i2.3347

Stafrezar, B. (2024). Potensi dan Tantangan Digitalisasi dalam Memajukan Wisata Halal di Indonesia: Solusi dan Implementasi. *Journal Of Economics, Business, Management, Accounting And Social Sciences*, *2*(6), 342–351.

Wulandari, A., Narimawati, U., & Syafei, M. Y. (2025). The Influence of Halal Friendly Attributes on Visit Intention Mediated by Destination Image and Artificial Intelligence Adoption in Tourist Destinations. *EKOMABIS: Jurnal Ekonomi Manajemen Bisnis*, *6*(01), 1–16.