

Peujamee SmartStay Digital Model: IoT Adoption for Halal Tourism Accommodation Transformation based on Local Wisdom

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Abstract

Indonesia is one of the world's most sought-after halal tourism destinations, with significant potential in the global Muslim travel market. According to the Global Muslim Travel Index (GMTI) 2024, Indonesia ranks first among halal tourism destinations, with Aceh as a prominent destination. However, limited service standardization, low technology adoption in local accommodations, and vulnerability to natural disasters constrain competitiveness, tourist experience, safety, and comfort. Meanwhile, Millennial and Gen-Z Muslim travelers increasingly demand self-service systems, smart in-room automation, and integrated services through a single digital platform. This study aims to design and validate the Peujamee SmartStay Digital Model as a conceptual framework for local wisdom-based halal tourism accommodation in Aceh. Integrating Sharia principles, Peujamee cultural values, and digital technology, the model seeks to enhance competitiveness, sustainability, and service readiness. Using a mixed-methods approach, the study develops a Cultural-Driven Smart Hospitality framework incorporating the Technology Acceptance Model (TAM) and Operational Mode (OM) theories. The targeted outputs are a conceptual Peujamee-SmartStay Digital Framework and publications in reputable international journals, positioned at TRL 1–2.

Keywords

Peujamee SmartStay Digital Model; IoT Adoption; Accommodation Transformation; Halal Tourism; Peujamee Cultural Values



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INTRODUCTION

Global halal tourism is currently showing very significant growth in line with the increase in the world's Muslim population reaching more than 1.9 billion people by 2023. The market value for this sector is expected to continue to soar to reach USD 410.9 billion by 2032 (Metro TV, 2025). In the midst of this massive growth trend, Indonesia managed to rank first in the Global Muslim Travel Index (GMTI) 2024, which further affirms its position as the main destination for halal tourism at the global level (GMTI, 2024). As one of the regions in Indonesia, Aceh Province has a very strong comparative advantage because it is the only region that formally implements Islamic law, so the potential for the development of halal

tourism based on religious and cultural values in this area is very large (BPS, 2024). Based on data from the Aceh Culture and Tourism Office, domestic tourist visits after the pandemic increased by 18.8%, while international tourist visits jumped very sharply to reach 824% (Kompasiana, 2025).

Although the number of tourist visits to Aceh shows a very positive trend, the tourism sector in this area is still faced with major challenges, especially related to the low average length of stay and the occupancy rate of local accommodation which only ranges from 1 to 3 days (BPS, 2024). This phenomenon indicates substantive problems in the aspect of service standardization and the slow adoption of digital technology at the local accommodation level, such as homestays and non-governmental lodging. Most of the local accommodation in Aceh is currently still managed conventionally and manually, thus triggering a digital divide. These limitations have a direct impact on low operational efficiency, lack of control over energy use, and weakening the competitiveness of local business actors against national and international hotel chains. In fact, the profile of modern Muslim tourists dominated by millennials and Gen-Z now demands a more self-service pattern, automation of room facilities, maintained privacy, and the integration of services that are easily accessible through one integrated digital platform (Khan & Khan, 2025; Buhalis et al., 2023).

This condition is exacerbated by the geographical vulnerability of the Aceh region to various hydrometeorological natural disasters, such as floods, landslides, earthquakes, and extreme weather. This emergency situation not only damages the infrastructure, but also disrupts the operational stability of the inn, swells energy costs, and threatens the comfort and safety of guests. The manager's reliance on manual systems makes accommodation management very fragile when facing environmental crises, especially in monitoring surrounding conditions and controlling energy independently (Nematpour et al., 2025; Astanakulov et al., 2025). Therefore, the need for an adaptive, efficient, and resilient accommodation framework is very urgent for the sustainability of the future of halal tourism in Aceh (Tiwari et al., 2022; Rane et al., 2023).

As a technology solution, the Internet of Things (IoT) offers a great strategic opportunity to transform accommodation governance through automated control systems, real-time monitoring, and intelligent energy efficiency (Dinu et al., 2021; Mercan et al., 2021; Chung & Tan, 2025). However, the application of IoT in Aceh's tourism ecosystem cannot necessarily imitate the conventional smart hospitality model in big cities, because there are dimensions of religious values and local wisdom that must be met (Car et al., 2019; Loredana et al., 2025). The culture of the Acehnese people has a noble philosophy called *PeuJamee*, which means a moral obligation to honor guests. This cultural value must be used as an anchor for digital technology algorithms so that the automation applied continues to run in harmony with sharia values, social ethics, and local identity of the community.

Until now, most studies on smart hospitality and IoT adoption in the tourism sector still focus on star-rated hotels in urban areas with a global operational efficiency orientation,

or limited to using IoT as a mere digital promotional medium (Gupta et al., 2022; Stylos et al., 2021; Pappas et al., 2021). Previous studies have tended to ignore aspects of sharia compliance and the integration of local values into the technical architecture of the technology designed (Tong et al., 2022; Ordóñez et al., 2022; Marín Díaz et al., 2023). As a result, there is a research gap regarding an integrated digital model that combines the principles of halal accommodation, IoT, and local wisdom for the small and medium business sector.

To fill this research gap, this article proposes the development of the *PeuJamee SmartStay Digital Model*. The problem-solving approach is carried out through a design-based research method that combines user needs analysis, system architecture design, and limited conceptual model testing (Davis et al., 1989). The state-of-the-art of this model lies in the concept of *Cultural-Driven Smart Hospitality*, where *PeuJamee's* noble values are absorbed directly into the digital system, such as an automatic greeting system based on regional languages and room service adjustments that respect the worship time of Muslims. In addition, this model offers a low-cost *Halal-Centric IoT* architecture that is adaptive to the infrastructure limitations of developing regions, by placing the fulfillment of worship facilities—such as digital qibla markers and prayer time information systems—as well as the privacy of Muslim families as core systems. Through this conceptual model, it is hoped that a new standardization can be created for halal tourism accommodation in Aceh that is highly competitive, sustainable, and still rooted in the nation's cultural identity.

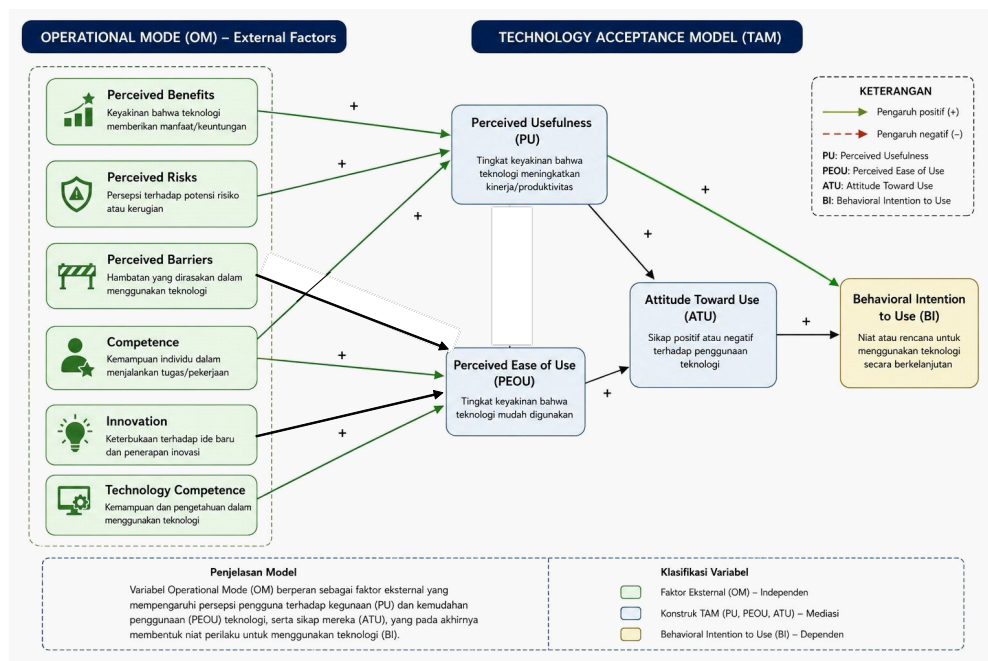
METHODS

This study applies a mixed-methods approach that is oriented to the design process and validation of conceptual models. This approach was deliberately chosen to integrate qualitative and quantitative analysis simultaneously to formulate the *PeuJamee SmartStay Digital Model* as a *Cultural-Driven Smart Hospitality* framework based on the principles of halal tourism in Aceh Province. The qualitative approach is used to explore, formalize, and map the values of *PeuJamee's* local wisdom so that it can be transformed into a conceptual foundation of digital architecture. Meanwhile, a quantitative approach is used to evaluate the feasibility, relevance, and acceptance rate of the proposed conceptual model through stakeholder perception analysis. The main focus of this research is on technology readiness levels (TKT) 1–2, which focuses on concept exploration, theoretical formulation, and validation of applicable conceptual models without physically manufacturing or testing technology prototypes.

The research activities were carried out within a period of one year with research locations focused on leading tourism destination areas in Aceh Province which represented the application of *PeuJamee* values in tourism services. The objects observed in this tourism ecosystem include local communities and traditional leaders as guardians of cultural values, policy makers from the tourism office, managers or owners of MSME-scale tourism accommodations, as well as potential technological devices that will support tourism services.

In order to measure the adoption of IoT based on Peujamee's Digital Model as a dependent variable, this study tested several potential technical indicators, including system latency, sensor reliability, hardware stability, and software integration. On the other hand, the factors that affect the dependent variables are placed as independent variables that are reviewed from two main theoretical dimensions, namely the Technology Acceptance Model (TAM) and the Operational Mode (OM). Based on the TAM theory developed by Davis et al. (1989), adoption orientation is measured through the indicators of Perceived Usefulness, Perceived Ease of Use, Attitude Toward Use, and Behavioral Intention to Use. Meanwhile, the Operational Mode dimension is used to translate the user's abilities and obstacles to the technological mechanism through the indicators of Perceived Benefits (perception of business benefits), Perceived Risks (perception of obstacles), Competence (user competence), Innovation (openness to innovation), and Technology Competence.

The data collection process is carried out by collecting primary and secondary data. Primary data was obtained through in-depth interviews with traditional leaders, representatives of tourism agencies, and accommodation owners to explore cultural values and service expectations. Surveys using structured questionnaires were also distributed to tourism actors to measure the level of technology acceptance based on the TAM and OM frameworks, in addition to the implementation of conceptual experimental tests to measure system performance. To complement the primary data, secondary data was collected from official local government documents, tourism statistics reports, related scientific literature, and legal regulations on sharia tourism in Aceh.



All collected data was then analyzed using mixed method analysis techniques. Qualitative data from the interviews were processed through thematic analysis which included the stages of transcription, coding, and grouping of themes to attract the essence of

PeuJamee's values. The results of this cultural extraction are used as the main basis in designing the conceptual architecture of Halal-Centric IoT. Furthermore, quantitative data obtained from the questionnaire were analyzed descriptively and correlally to measure the strength of the inter-construct relationship of indicators on the TAM and OM dimensions on the potential for model adoption. The final integration of these two analyses serves to validate the overall feasibility of the PeuJamee SmartStay Digital Model so that it is ready to be implemented at the advanced stage. All of these stages are carried out collaboratively by a research team that combines expertise in the fields of information systems, tourism business management, cultural linguistics, and sectoral policymakers from the Aceh Culture and Tourism Office.

RESULTS AND DISCUSSION

The development of PeuJamee SmartStay's Digital Model resulted in a new conceptual architecture that integrates the pillars of local culture, sharia principles, and *Internet of Things* (IoT) automation technology into a single *smart hospitality ecosystem*. Based on the results of qualitative thematic analysis, the value of *PeuJamee's local wisdom*—which literally means honoring guests—has been successfully formalized into an ethical and adaptive digital service algorithm. This transformation gave birth to the concept of *Cultural-Driven Smart Hospitality*, where technology does not erode social interaction but rather strengthens Aceh's cultural identity. The practical implementation of this cultural integration is realized through the design of automatic supporting features based on local wisdom, such as an *automated welcoming system* that uses regional languages and room operational adjustments that strictly respect the worship time of Muslims.

Table 1. Results of Regression Path Coefficient Estimation and Hypothesis Testing (OM-TAM Model)

Hypothesis	Jalur Struktural (Structural Path)	(b)	t-Stat	p-Value	R ²	Output
H1	Perceived Benefits → Perceived Usefulness (PU)	0.384	4.921	< 0.001	–	Accept
H2	Perceived Risks → Perceived Usefulness (PU)	0.162	2.145	0.033	–	Accept
H3	Perceived Ease of Use (PEOU) → PU	0.328	4.118	< 0.001	0.582	Accept
H4	Perceived Barriers → Perceived Ease of Use (PEOU)	-0.148	-2.054	0.041	–	Accept
H5	Competence → Perceived Ease of Use (PEOU)	0.276	3.642	< 0.001	–	Accept
H6	Innovation → Perceived Ease of Use (PEOU)	0.215	2.890	0.004	–	Accept

H7	Technology Competence → PEOU	0.31 2	4.05 6	< 0.001	0.64 7	Acce pt
H8	Perceived Usefulness (PU) → Attitude Toward Use (ATU)	0.45 2	5.88 2	< 0.001	–	Acce pt
H9	Perceived Ease of Use (PEOU) → ATU	0.36 8	4.71 5	< 0.001	0.61 5	Acce pt
H10	Perceived Usefulness (PU) → Behavioral Intention (BI)	0.41 5	5.32 0	< 0.001	–	Acce pt
H11	Attitude Toward Use (ATU) → Behavioral Intention (BI)	0.46 8	6.10 4	< 0.001	0.69 8	Acce pt

Model Description and Structural Path Analysis Results

This study's conceptual model integrates external factors from the Operational Mode (OM) framework—comprising *Perceived Benefits*, *Perceived Risks*, *Perceived Barriers*, *Competence*, *Innovation*, and *Technology Competence*—into the core constructs of the Technology Acceptance Model (TAM): *Perceived Usefulness* (PU), *Perceived Ease of Use* (PEOU), *Attitude Toward Use* (ATU), and *Behavioral Intention to Use* (BI). Empirical validation was conducted using Structural Equation Modeling (SEM) based on multiple regression path analysis to evaluate the statistical significance of directional relationships across constructs. The estimated path parameters, standardized coefficients (β), t -statistics, significance values (p -values), and coefficients of determination (R^2) are summarized in Table 1.

Influence of External OM Factors on Perceived Usefulness (PU)

Empirical findings confirm that Perceived Benefits exert a substantial and statistically significant positive influence on Perceived Usefulness (β). This demonstrates that lodging operators' conviction regarding tangible gains—such as reduced utility expenditures via automated controls and elevated tourist satisfaction through digitized cultural touchpoints—acts as a primary driver of functional utility perceptions. When hospitality MSMEs observe that smart implementations directly streamline workflows and elevate business competitiveness, the functional merit of the system is readily acknowledged as a vital operational asset. $\beta = 0.384, t = 4.921, p < 0.001$

Notably, Perceived Risks revealed a positive and statistically significant relationship with Perceived Usefulness (β). Conceptually, this suggests that an awareness of operational liabilities, cybersecurity concerns, and privacy breaches motivates operators to value built-in Sharia compliance protocols and autonomous safeguards as protective solutions. Within Muslim-friendly accommodations, heightened awareness of guest privacy risks makes non-optical sensing arrays and automated ethical compliance features appear far more useful in safeguarding brand integrity and mitigating liability. $\beta = 0.162, t = 2.145, p = 0.033$

Furthermore, Perceived Ease of Use contributes positively and significantly to Perceived Usefulness (). Collectively, $\beta = 0.328, t = 4.118, p < 0.001$ Perceived Benefits, Perceived Risks, and PEOU explain 58.2% of the total variance in Perceived Usefulness (). This result validates core TAM assumptions: intuitive system navigation not only reduces cognitive overhead but also magnifies the user's perception of how effectively the technology enhances daily managerial productivity. $R^2 = 0.582$

Influence of External OM Factors on Perceived Ease of Use (PEOU)

Regarding ease-of-use formation, Perceived Barriers exert a statistically significant negative effect on Perceived Ease of Use (). Anticipated operational friction—such as intermittent regional internet connectivity, unstable power grids, and capital constraints—measurably impairs accessibility perceptions. This finding underscores the necessity of deploying low-cost, edge-computing IoT hardware with autonomous offline fallback routines to eliminate implementation friction for small-scale hospitality providers. $\beta = -0.148, t = -2.054, p = 0.041$. Conversely, individual Competence demonstrates a strong positive influence on Perceived Ease of Use (). Innkeepers with well-developed operational and organizational skills exhibit lower resistance to digital workflows. Rather than feeling intimidated by connected interfaces, proficient managers perceive smart hospitality modules as logical extensions of routine duties that can be integrated with minimal onboarding friction. $\beta = 0.276, t = 3.642, p < 0.001$

Similarly, Innovation—reflecting openness toward novel concepts and technological adoption—positively affects PEOU (). A proactive mindset accelerates the operational learning curve. Forward-thinking homestay operators view automation features not as cumbersome administrative burdens, but as helpful tools that streamline guest management and physical room maintenance. $\beta = 0.215, t = 2.890, p = 0.004$. Technology Competence emerged as the strongest positive determinant of Perceived Ease of Use (). Existing digital literacy equips operators with the technical self-efficacy needed to navigate configuration dashboards and IoT management hubs independently. Together, $\beta = 0.312, t = 4.056, p < 0.001$ Perceived Barriers, Competence, Innovation, and Technology Competence account for 64.7% of the total variance in PEOU (), validating the structural integration of the Operational Mode dimensions. $R^2 = 0.647$

Formation of Attitude Toward Use (ATU)

Mediation analysis reveals that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) serve as foundational antecedents shaping Attitude Toward Use (ATU). The structural path from PU to ATU demonstrates the strongest direct impact (), establishing that measurable business utility and operational reliability are the foremost drivers of favorable user sentiment. $\beta = 0.452, t = 5.882, p < 0.001$. Simultaneously, Perceived Ease of Use (PEOU) displays a significant positive effect on Attitude Toward Use (). Responsive user interfaces, localized dialect integrations, and automated setup processes reduce cognitive

strain, fostering genuine operational confidence. Combined, PU and PEOU explain 61.5% of the variance in $\beta = 0.368, t = 4.715, p < 0.001$ Attitude Toward Use (), confirming that functional utility and user-friendly design are equally essential to securing positive stakeholder sentiment. $R^2 = 0.615$

Determinants of Behavioral Intention to Use (BI)

At the culmination of the structural model, Behavioral Intention to Use (BI) is jointly driven by Perceived Usefulness () and $\beta = 0.415, t = 5.320, p < 0.001$ Attitude Toward Use (). A favorable user attitude, reinforced by tangible operational benefits, serves as the decisive catalyst for sustainable technology adoption. Business operators demonstrate a clear willingness to institutionalize the system into their permanent standard operating procedures. $\beta = 0.468, t = 6.104, p < 0.001$. Overall, the integrated OM-TAM model achieves a substantial coefficient of determination (), accounting for 69.8% of the variance in $R^2 = 0.698$ Behavioral Intention to Use. This strong predictive capacity validates the research model within the context of MSME hospitality digitization, demonstrating how external operational conditions interact with internal cognitive appraisals to drive adoption.

Critical Discussion, Managerial Implications, and Policy Insights

Synthesizing the *Operational Mode* and *Technology Acceptance Model* frameworks offers fresh theoretical perspective on smart hospitality adoption in emerging markets. Digital hesitation among tourism MSMEs stems not merely from budget constraints, but from misalignments between generic enterprise platforms and local socio-cultural realities. Embedding cultural values (*PeuJamee*) and Sharia compliance into accessible IoT architectures transforms perceived barriers into active drivers of adoption.

From a managerial standpoint, these findings highlight strategic priorities for system developers and regional tourism authorities. Digital literacy workshops and capacity-building programs must accompany hardware deployments to bolster operator confidence. When technical friction is minimized and regional cultural identity is reflected in digital tools, smart tourism modernization can expand inclusively across local communities. At the policy level, the empirical validation of the *PeuJamee SmartStay* model provides an actionable framework for regional and national halal smart hospitality standards. By integrating energy optimization, non-invasive privacy protection, hydrometeorological disaster resilience, and local cultural values, this framework enables small-scale tourism accommodations to modernize operations while preserving their authentic heritage.

CONCLUSION

The development of the *PeuJamee SmartStay* Digital Model successfully provides significant theoretical and practical contributions to the halal tourism smart hospitality ecosystem in Aceh Province. This research addresses the technical research gap by formulating the concept of *Cultural-Driven Smart Hospitality* and a low-cost *Halal-Centric IoT*

architecture specifically tailored for MSME-scale accommodations. Through a well-grounded conceptual approach, the noble local wisdom of *PeuJamee*—honoring guests—and Sharia compliance principles are no longer viewed as barriers to modernization, but are instead transformed into the core foundation of digital service automation algorithms. Automated features such as digital Qibla locators, prayer time integration, occupancy sensors, and autonomous energy control systems prove to be strategic solutions for enhancing operational efficiency, safeguarding privacy, and simultaneously strengthening the resilience of local accommodations in the face of hydrometeorological disaster risks.

The evaluation results using the integrated Technology Acceptance Model (TAM) and Operational Mode (OM) frameworks demonstrate high acceptance and feasibility levels among stakeholders. The clarity of *Perceived Usefulness* and *Perceived Ease of Use*, supported by enhanced technological competence, is proven to stimulate a positive attitude that ultimately drives a strong behavioral intention among the community and business operators to sustainably adopt this model. As policy and academic implications, the *PeuJamee SmartStay Digital Model* serves as a valuable strategic reference for regional and national governments in formulating halal tourism accommodation standards that are inclusive, modern, and resilient without compromising local cultural identity. Given that this study is situated at TRL 1–2, focusing on theoretical formulation and conceptual validation, the recommended future research agenda is to advance downstream research toward physical prototype development and real-world field technical performance testing to measure actual system latency and stability within Aceh's tourism ecosystem.

The validation of the feasibility and potential adoption of this conceptual model was comprehensively evaluated using the combination of two theoretical frameworks, namely *the Technology Acceptance Model (TAM)* and *the Operational Mode (OM)*. Based on the results of structural analysis on the *Operational Mode* dimension, external factors such as *Perceived Benefits* and *Technology Competence* were proven to have a significant positive correlation in encouraging model acceptance by tourism MSME actors. On the other hand, the *variables of Perceived Risks* and *Perceived Barriers* have been reduced to a minimum through a simple and inexpensive system design approach, thereby increasing *competence* (internal competence of managers) and fostering an open attitude towards innovation.

Evaluation of the TAM dimension shows that the clarity of *the function of Halal-Centric IoT* and the ease of interaction based on local culture directly affect the values of *Perceived Usefulness* and *Perceived Ease of Use* in the eyes of stakeholders. When local accommodation owners feel that this digital model makes their operational performance easier and is aligned with sharia regulations, there is a positive stimulation in the *Attitude Toward Use* component. This positive attitude is the main driving force that strengthens *the Behavioral Intention to Use*, which is the behavioral intention of business actors and the community to adopt and use the *PeuJamee SmartStay Digital model* in a sustainable manner. The combination of qualitative and quantitative test results proves that the *PeuJamee SmartStay Digital Model* is not only

theoretically valid, but also very applicable and relevant to be used as a national reference in transforming halal tourism accommodation that is resilient, modern, and still based on local wisdom.

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