The Influence of User Perceptions on Adopting and Using AI Chatbots for Halal Travel Information among Muslim Travellers

Nur Adelayati Mat Lias, Nur Reen Nuwairah Radzli, Mohd Hasrul Yushairi Johari*

University Teknologi MARA, Kampus Bandaraya Melaka

***Corresponding Author**

DOI: https://dx.doi.org/10.47772/IJRISS.2025.908000308

Received: 09 August 2025; Accepted: 15 August 2025; Published: 09 September 2025

ABSTRACT

The rapid adoption of AI chatbots in tourism presents significant opportunities; however, their utility in halal tourism remains underexplored. This study investigates the factors influencing Muslim travellers' use of AI chatbots for Halal tourism information. The primary problem statement revealed that many existing chatbots fail to meet the religious and cultural needs of Muslim travellers. To address this, the study's objectives are to explore how perceptions of ease of use, usefulness, trust, anthropomorphism, intelligence, and cultural compatibility affect AI chatbots' intention to use (AIN) and their actual use (AUE). This study evaluated these factors and their impact on chatbot usage in halal tourism. The study surveyed 308 Muslim travellers using a quantitative approach. Data analysis was conducted with Partial Least Squares Structural Equation Modeling (PLS-SEM), employing the software WarpPLS 8.0. The results indicate that all six factors–perceived ease of use, perceived usefulness, perceived trust, anthropomorphism, perceived intelligence, and cultural compatibility–significantly influence the actual use of chatbots through adoption intention. The findings confirm that ease of use and trust are critical, but user intention is essential for increasing the adoption of AI. These findings suggest that developers should focus on enhancing the cultural and religious compatibility of AI chatbots to meet the needs of Muslim travellers.

Keywords: Halal tourism, AI Chatbots, Muslim travellers, halal tourism, TAM Model

INTRODUCTION

AI has rapidly developed into a vital component in tourism and chatbots have emerged as a major tool in trip planning and customer service. These digital assets include travel assistants on airline websites, hotel applications, travel websites to book a flight, or enquire about travelling suggestions. Chatbots such as ChatGPT (OpenAI), Gemini (Google), and Bing AI (Microsoft) can respond in natural language and provide immediate recommendations. However, as noted by Battour et al. (2023), these tools are not designed to support the specific religious requirements of Muslim travellers. To cater to the needs of Muslim travellers, such as halal-certified food, prayer times, and qibla direction services, these are rather common elements found at hotel front desks and tourism offices, which they tend to seek out as a validated source (Wan Sulong et al., 2021). Although AI chatbots can occasionally respond to general enquiries, most do not offer trusted, locally relevant information that follows Shariah-compliant suggestions.

A real-life example is the HalalTrip Companion chatbot, specifically designed for Muslim travellers to find halal food establishments, local mosques, prayer areas, and other appropriate travel information that suits Muslim ideals and Islamic values globally. Another example is the Muslim Pro app, a mobile application Muslims use worldwide. Although it is not a chatbot and does not demonstrate interactive chat capabilities, it provides important Islamic features such as accurate prayer times, Qiblah direction, Quran recitation with translation, and a directory of nearby Halal restaurants and prayer spaces. Even though travelling is an everyday activity for many Muslims, most existing chatbots only focus on general travel needs and do not include features related to Halal requirements. This lack of cultural and religious support may lead Muslim users to feel excluded, frustrated, and less confident when using online travel services.

Artificial intelligence (AI) is widely used in the tourism industry to improve service quality and customer experience. One of the most popular tools is the AI chatbot, which helps travellers by offering instant responses, travel suggestions, and booking support. However, most existing chatbots are designed for general travel needs and do not cater to specific traveller segments, such as Muslim travellers with religious and cultural requirements.

Echoing the concerns of this study, Battour et al. (2022) identified a similar preference among Muslim travellers in Turkey for services that align with Islamic principles, including Halal food and prayer facilities, underscoring the global relevance of such needs across diverse Muslim communities.Similarly, Pillai et al. (2022) in India reported that Muslim travellers often feel disappointed when AI travel systems do not reflect Islamic values. Shen et al. (2023) also pointed out that many AI systems rely on outdated or biased information, which can lead to misleading suggestions. This is a significant issue because Muslim users tend to trust that the chatbot will provide correct and appropriate information, especially for religious-related services. Unfortunately, when the AI system fails to deliver accurate responses, it may reduce users' confidence and discourage future usage. Current AI chatbots still lack features that consider Islamic values, which shows a weakness in their design and development. In Malaysia, a country known for promoting Halal tourism, the use of AI chatbots is still growing. However, there is a lack of research that explores how well these systems meet the needs of Muslim travellers. Although Malaysia is a leading Halal-friendly destination, the effectiveness and reliability of AI chatbots in providing Shariah-compliant travel services remain unclear.

Given this gap, this study investigates how AI chatbots can better support Halal tourism by analyzing user perceptions and adoption behaviours. Specifically, it addresses 1) To examine how perceived ease of use, usefulness, trust, anxiety, intelligence, cultural compatibility, and anthropomorphism influence actual AI chatbot usage, which is mediated by adoption intention; 2) To investigate the mediating role of adoption intention in linking user perceptions to actual chatbot usage in Halal tourism. By examining these factors, the research aims to enhance AI chatbot design, ensuring they align with Muslim travellers' religious and cultural expectations while improving accessibility and trust in digital travel assistance.

Problem Statement

Chatbots are now commonly used in the tourism industry to improve customer service. In theory, chatbots should help Muslim travellers by giving fast and useful information. However, many users in Malaysia have said they are not happy with how chatbots deal with religious-related questions. For example, Battour et al. (2022) found that chatbots in Halal tourism often give the wrong advice, which makes users lose trust. Kim et al. (2023) also showed that even when users ask clear and relevant questions, serious mistakes can make them stop using the chatbot in the future. One real-life case happened in 2024, when ChatGPT wrongly translated a statement by Malaysian MP Teresa Kok about halal certification. This confused and made people question the system's reliability (Malay Mail, 2024). Mistakes like this can seriously affect people's trust, especially when the topic is sensitive.

Besides, travellers, especially older users or those unfamiliar with technology, find chatbots hard to use. If something is not easy to use, people are less likely to use it (Davis, 1989). A study in Malaysia found that older users (average age 65) struggled with chatbots because of unfamiliar layouts, confusing buttons, and strict typing rules. Many needed help to use basic features, showing that the system was not user-friendly, which can stop people from trusting or using it (Yong & Lee, 2025). People also expect the chatbot to be helpful, like helping them book Muslim-friendly hotels, find Halal food, or check prayer times. When it fails to do these things properly, it becomes less helpful in users' eyes (Pillai & Sivathanu, 2020). Studies show that older adults often feel nervous or uncomfortable when using technology, including chatbots. A recent review found that many older users lack confidence and are unsure how to interact with these systems, which causes them to avoid using them completely (Yu & Chen, 2024). Trust is also a big issue. In 2025, an elderly couple in Malaysia travelled over 300 km to visit a traveller spot that turned out to be fake, based on an AI-generated video (Yasmine, 2025). This case shows how easily people, especially those not familiar with digital tools, can be misled, leading to frustration and loss of trust.

Due to these challenges, adoption rates for AI chatbots in Halal tourism remain low. Sumarjan et al. (2023) noted that even though many Malaysians are aware of tourism chatbots, few actively use them, preferring traditional

methods due to concerns over accuracy, usability, and trust. To address these gaps, this study investigates how Muslim travellers' perceptions, including ease of use, usefulness, trust, technological anxiety, perceived intelligence, anthropomorphism, and cultural compatibility, would shape their intention to use chatbots and, ultimately, their actual usage. Specifically, the study examines 1) How do user perceptions, such as ease of use, usefulness, trust, anxiety, intelligence, cultural compatibility and anthropomorphism, influence the actual usage of AI chatbots? and 2) How does adoption intention mediate the relationship between user perceptions and the actual usage of AI chatbots in Halal tourism? By answering these questions, this research aims to guide the design of chatbots that better meet the needs of Muslim travellers in Malaysia.

LITERATURE REVIEW

This chapter explains the studies and theories that have been presented in the past and supports this research. The Technology Acceptance Model (TAM) introduced by Davis (1989) is one of the primary theories employed. TAM is a popular model that describes the process of a person deciding to adopt or resist new technology. It concentrates on two important dimensions: perceived ease of use (PEA) and perceived usefulness (PUL). Perceived ease of use is the ease of use, together with its simplicity, that seems to make the system desirable to use, whereas perceived usefulness is the level at which an individual feels the system can enhance their work or experience in general. PEA and PUL serve as the primary independent variables (IVs) in this research

The relevance of the TAM theory in this study is very high since it facilitates understanding how Muslim travellers choose to utilize chatbots using AI within the scope of Halal tourism. Many travellers use chatbots to get fast access to Halal food, prayer spaces, or Shariah-compliant hotels (Battour et al., 2022). When the chatbot is simple to operate and provides functional responses, more people will continue to use it. For example, travellers may feel more comfortable accessing prayer times or locating Halal restaurants through a chatbot. This demonstrates that perceived ease of use and usefulness factors are highly influential in encouraging users to adopt the technology, which becomes crucial when dealing with sensitive and meaningful information, such as in the context of Halal tourism. Besides PEA and PUL, this research has four other important variables. Perceived trust (PTR), the sense of the safe and reliable chatbot, anthropomorphism (ANM), how human-like the chatbot is, perceived intelligence (PNT), how smart the system is and technological anxiety (TNX), and fear of anxiety some users experienced with using technology. Moreover, in this study, PEA and PUL directly determine the adoption intention (AIN) of users and indirectly determine the actual use (AUE) of AI chatbots. This research extends the original TAM model by explaining how perceptions translate into actual behaviours among Muslim travellers, highlighting the role of additional variables, especially adoption intention (AIN) as a mediating factor. The current work seeks a more in-depth and comprehensive insight into what drives the adoption of chatbots in the context of faith-based tourism.

Perceived Ease of Use

One of the significant determinants of the willingness of people to embrace new technology, particularly in tourism, is perceived ease of use. It is vital in environments where tech-savvy individuals coexist with those who have less technical ability. It is the extent to which a person believes that having a system like a chatbot will be easy and straightforward to comprehend (Davis, 1989). Travellers will be responsive and may stick to the system when they find it easy to navigate. Thus, they can get frustrated and abandon their use when confusing or complicated.

Ease of use is a factor in Halal tourism. The Muslim travellers rely on chatbots to acquire timely and concise information regarding Halal food, prayer rooms, and Shariah-compliant hotels. It makes the interaction more comfortable and convenient because it has a user-friendly design with a clear structure, simple choices, easy navigation, and support across multiple languages, especially Arabic and other languages (Pillai & Sivathanu, 2020). When halal-related information is easy to find, users, especially older people or those unfamiliar with technology, can use the chatbot more easily to plan and book their trips (Rafiq et al., 2022). Not only is this ease of use limited to first impressions, but it also influences long-term satisfaction and trust. Visitors are more likely to stick to a system that functions without complications, saves time, and provides accurate responses. Over time, positive experiences can turn the chatbot from just a tool into a trusted travel companion, encouraging frequent use and recommendations.

Perceived Usefulness

Perceived usefulness can be defined as the belief that Muslim travellers think that using a technology, such as an AI-powered chatbot, can improve their travel or help them find what they need to follow Halal rules. This perception is critical because it determines whether they will positively or negatively respond to using the chatbot (Kim, Park, & Morrison, 2008). Valuable services might be personalised Halal travel advice, quick replies, prayer time reminders, nearby Halal restaurants, or easy hotel booking. When the chatbot offers these, users see them as helpful and important. Usefulness is important in Halal tourism since Muslim travellers seek information that conforms to their religious and cultural beliefs. Research indicates that in cases where chatbots assist in resolving the typical issues travellers might encounter during their journeys, like locating Halal-certified food or the closest mosque, travellers are more likely to continue utilising the chatbots (Rafiq et al., 2022). Others will also want to use the tools that can help them save time and be less stressed during their trips (Xu et al., 2019). Therefore, anyone using a chatbot feels it is worth using when accurate, relevant information is provided about Halal. Developers must update chatbot functionality to continue addressing the needs of the travellers by adapting it to feedback and usage statistics.

A study suggests that users perceive chatbots as applicable during their first interaction and after repeated use across multiple travel situations (Orden-Mejía et al., 2025). A broader conceptual framework by Battour (2019) also mentioned how AI-enabled tools in Halal tourism, like chatbots, can enhance Muslim travellers' experience by offering timely, religion-compliant information, boosting their perceived halal value and satisfaction. When a chatbot provides useful information that aligns with Halal requirements, users are more likely to feel satisfied with the experience. This can establish a significant relationship between the user and the technology, where usefulness encourages frequent use and creates long-term value in Halal tourism.

Technological Anxiety

Technological anxiety, also known as technophobia, is individuals' fear, uneasiness, or reluctance to use modern technologies or sophisticated digital devices (Pfaffinger et al., 2020). Most Muslim travellers, particularly older adults or those living in areas with limited technological exposure, may experience technophobia, a fear or anxiety toward unfamiliar digital systems like chatbots (Smrke et al., 2025). This psychological barrier is prevalent among older or less educated individuals, which can reduce their willingness to use chatbots for Halal-related travel information. They may fear that they will commit a mistake, feed misspelt information, or not know enough about the manner of operation of the chatbot, which may result in misunderstandings or unsuccessful travel planning.

This anxiety may even increase when users fear they can lose their personal information, the system will crash, or the chatbot may not work when it is crucial. Muslim travellers need access to the right and dependable information. According to the study by Berakon et al. (2021), trust, usefulness, and ease of use are the most common factors influencing the willingness of Muslim travellers to engage with Halal travel applications, particularly when they receive practical and culturally friendly information.

When travellers are uncertain whether the chatbot will provide accurate or respectful replies, they can decide not to use it. Instead, they may desire to talk to someone in person or at tourist agencies, where they have more control. For example, Dekkal et al. (2023) found that anxiety can weaken the connection between trust and how much people use insurance chatbots. Although the users may trust the chatbot, anxiety may still prevent them from using it. To mitigate this fear, developers and travel companies should create chatbots that are easy to navigate, culturally sensitive, and easy to use. As suggested by Hafidz et al. (2024), developing multilingual chatbots such as one based on BERT for Halal tourism in West Sumatra can help ensure users engage more comfortably in their preferred language, also responding in culturally relevant ways. Added details that may make users more comfortable, including brief tutorials, demo videos, or a step-by-step initial use process.

Perceived Trust

Perceived trust represents the expectation that the chatbot can provide correct, flexible, and trustworthy information and even help safeguard users' personal and financial data. Trust plays a role in Halal tourism since

Muslim travellers trust AI and can get regular updates about available Halal restaurants, prayer rooms, and Shariah-compliant hotels (Battour et al., 2022). Users are asked to provide some data, such as ticket booking information, contact data, or credit card details, to use these services. Users who do not trust the chatbot will likely never use it, even though it might enhance their travel planning.

Trust allows users to be sure that their chatbot will serve their needs sufficiently and respect their personality and religious requirements. Among the key drivers that facilitate the building of trust is system transparency. Studies indicate transparency is significant in ensuring users feel comfortable with an intelligent system (Wanner et al., 2022). The other key issue is that the chatbot should be able to identify and respect Islamic values. Chatbots capable of accepting accurate Halal information and thinking would not be suspected of recommending something opposite to Islamic values and thus could be trusted by Muslim users more (Battour et al., 2022).

Research indicates that a trusted system will be more likely to be used repeatedly. By trusting a chatbot, users become more willing to utilise its services during the trip and recommend it to others. Affandi et al. (2025) argue that trust contributes profoundly to users' willingness to reuse a digital platform and recommend positive experiences to their family and friends. This is particularly relevant in tourism, as travellers often consult individuals with similar religious needs. Developers are also advised to keep the chatbot frequently refreshed, listen to user comments, keep the system up-to-date and polite, and be culturally conscious to keep trust levels high.

Anthropomorphism

Anthropomorphism involves attributing human sentiments, ideas, or attitudes to non-living entities such as animals, robots, or chatbots (Alabed et al., 2022). These human-looking attributes can help Muslim travellers feel more comfortable and identify with the chatbots in Halal tourism. For example, a chatbot that addresses people, talks to them politely and respectfully, and uses appropriate language can make conversations more personal and trusting. This is relevant when users use the system to provide religious and culturally sensitive data, like finding a Halal restaurant or the closest mosque. Studies demonstrate the significance of such characteristics as facial expression, eye contact, avatars, emojis, and tone of conversations in providing a sense of connection and attentiveness (Bortko et al., 2023). A chatbot's use of friendly language makes the user feel respected and understood. Such responses would facilitate trust, enabling users to feel more related to the chatbot (Ltifi, 2023).

Chatbots with friendly features such as smiling avatars or calm tones can help reduce user anxiety, especially when searching for Halal food in unfamiliar places. In tourism, trust, respect, and personalisation are essential. Chatbots with human-like qualities through anthropomorphism make them feel more approachable and engaging (Cai, Li, & Law, 2022). When chatbots appear kind and respectful of Islamic values, Muslim travellers are more likely to trust them, feel satisfied, and continue using them in the future (Al-Oraini, 2025).

Perceived Intelligence

Perceived intelligence defines how customers feel the chatbot is intelligent, responsive, and capable of helping in a reliable and tailored way to the specific context. This has played a crucial role in the travel business by implementing chatbots. To give an example, a mixed-methods study in India revealed that perceived intelligence directly influences both trust and behavioural intention, along with other factors such as anthropomorphism and ease of use, in predicting actual chatbot adoption within hospitality and tourism settings (Aslam et al., 2025; Pillai & Sivathanu, 2020). Intelligent agents like AI chatbots can make it easier for users to find information and make decisions, which helps them see the chatbot as innovative and useful. For Muslim travellers, AI chatbots that give clear guidance can help them quickly find accurate halal tourism information. This makes the chatbot seem more intelligent, especially when it can solve problems, give helpful answers, and communicate clearly (Schei et al., 2024).

Moussawi & Koufaris (2019) and Tussyadiah & Park (2017) observed that using intelligent service agents in the hospitality environment positively impacted user perceptions and intentions to adopt the user agent. Intelligence is also needed to understand Shariah-based sensitivities in certain culturally sensitive industries, as seen in Halal

tourism. This can be in the form of locating a certified Halal restaurant, interpreting prayer times, or making recommendations appropriate to the region's culture. Chatbots perceived to possess this knowledge have a higher chance of gaining user support and remaining in use within the community.

Cultural Compatibility

Cultural compatibility means how well different cultural values and behaviours fit and work together (Sustainability Directory, 2025). In this study, it refers to how an AI chatbot's language and answers match Muslim travellers' cultural and religious values to give correct halal tourism information. This includes using local languages like Malay or Arabic, polite greetings such as Assalamualaikum, and avoiding any suggestions that may be rude or unsuitable. To achieve this, the chatbot should follow Islamic values and only promote halal-friendly products and services.

The theory of cross-cultural adoption suggests that technology would be more acceptable when used in line with the traditions and norms of the user base, as failure to align the two may lead to negative attitudes or outright rejection (Romero-Charneco et al., 2025). Gatzioufa & Saprikis (2022) agree that anthropomorphism and intelligence only enhance tourism chatbots' use if cultural expectations are fulfilled. Even excellent chatbots will not be of any use when it comes to Muslim consumers, as there will not be any language localisation and culturally specific information training, including databases on Halal foods.

This is supported by Zhao, Sun, Liu, and Wong (2025), highlighting that linguistic register and cultural tone significantly contribute to perceived credibility and high user satisfaction in chatbot design. When designing halal tourism chatbots, cultural compatibility should be considered right from the start. This involves integrating new interactive designs, user interface designs, and dataset selections that consider Islamic norms and the region's customs. Additionally, cultural compatibility tasks should be developed to identify whether artificial intelligence chatbots adhere to the cultural standards of Muslims. This is because culturally sensitive innovations help build greater loyalty in hospitality.

Adoption Intention

Adoption intention is described as the willingness or likelihood of a user to adopt and use a given technology in the future. As the theories of the Technology Acceptance Model (TAM) may state, this intention can be formed under the influence of several crucial elements, such as perceived intelligence, compatibility, trust, and humanised design. In a broad study in India, Pillai and Sivathanu conclusively established that perceived usefulness and anthropomorphism were strong predictors of chatbot adoption intention, alongside perceived intelligence and trust.

In line with this, a Malaysian study involving hospitality and tourism sectors published by Sumarjan et al. (2023) revealed that perceived usefulness, ease of use, and trust played a significant role in determining whether customers would use a chatbot. Their results have highlighted the need to create chatbots that can carry out operations in an effective manner; however, they must also offer a satisfactory experience to the user. In the case of religious tourism, it is more important to be dependable and sensitive to the culture.

Nonetheless, this kind of design must be accompanied by a reasonable degree of technological and cultural compatibility. Adoption intention is a mediating variable that is used to describe the process through which users' perceptions of the use of AI chatbots, including trust, ease of use, and intelligence, can be translated into their real use. Such models as TAM and UTAUT support this idea, pointing to intention to use as a crucial mediator between attitude and real behaviour (Venkatesh et al., 2003).

Actual Usage

Actual usage implies the frequency of interaction between the user and a chatbot in a real-life scenario, not just intending to use or intend to use it. Although good intentions are essential, it does not always mean a high rate of actual usage. As an example, an effect of stickiness was found in a study by Pillai and Sivathanu (2020), in India, where user intentions to use technology do not necessarily translate to use because many people were still inclined to traditional travel agents. In line with this argument, Gatzioufa and Saprikis (2022) indicated that the

willingness to commit to action needs a great degree of assurance of the chatbot's reliability and cultural sensitivity.

The actual usage that represents value to Muslim travellers by providing context and culturally acceptable information is positively impacted by accurate, context-specific chatbots that support Muslims in finding Halal restaurants or locating nearby mosques (Battour et al., 2022). However, when chatbots cannot achieve the user expectations because of the inadequate level of intelligence or recommendations based on irrelevant or inappropriate criteria, users are likely to stop using chatbots and refer to more conventional ways of information. For Muslim travellers, reliable and cultural support is crucial in transforming intent into continued usage. This research is therefore used to test the effects of individual perceptions, including trust, perceived usefulness and cultural compatibility, on observed usage behaviour through an adoption intention as a mediator in the case of the Halal tourism chatbot application.

Adaptation of Pillai's Framework for the Context of Halal Tourism Chatbots

In this study, the original framework developed by Pillai and Sivathanu (2020) is adopted with slight modifications. Their model was initially constructed to examine user interaction and AI chatbots in the larger tourism sector. To adjust it more closely to the application area of Muslim travellers seeking Halal-related travel information, this research proposes Adoption Intention (AIN) as a mediating factor between user perceptions, such as trust, perceived usefulness, and cultural compatibility and actual usage. This modification aims to more accurately capture the behavioural decision-making process of Muslim travellers, particularly how they engage in informed, faith-compliant, and culturally sensitive travel planning through AI chatbots.

Removal of Stickiness to Traditional Travel Agents / Planners (STT)

The original model offered by Pillai and Sivathanu (2020) incorporated a variable named Stickiness to Traditional Travel Agents (STT), and this research eliminates STT. However, even though it does not apply to more general tourism situations, where people still turn to travel agents as a habit or because they are used to using them. In the context of Halal tourism, the focus shifts toward the alignment between chatbot services and users' religious and cultural values, rather than familiarity with traditional channels. Including STT in the model would create conceptual redundancy, since items such as perceived ease of use (PEA) and perceived usefulness (PUL) cover aspects of convenience and practical utility. Therefore, eliminating STT simplifies the structure and allows for a more specific inquiry into AI chatbots' cultural and religious compatibility for Muslim travellers.

Addition of Cultural Compatibility (CCO)

This paper proposes a new variable, cultural compatibility (CCO), to allow the model to explain the significance of cross-cultural differences. CCO evaluates the fit between Muslim travellers' culture, language, values, and social norms, with the AI chatbot working. The justification of this addition is based on the theories that have already been established, Schooler & Hofstede (1983), and Cultural Adaptation Theory of Kim (2001), which states that individuals tend to use the technologies that best describe them in terms of identity and conversation patterns.

Cultural compatibility is particularly vital in the case of Halal tourism due to the tendency of Muslim travellers to request sensitive and religion-related details, including prayer schedules, Halal foods, and dressing codes (Battour & Ismail, 2016). The model can be improved by adding cultural compatibility (CCO), so it does not just focus on how helpful or easy the chatbot is and helps explain how Muslim users make important decisions based on their values when using AI chatbots. This addition allows the framework to better reflect the religious, ethical, and cultural values shaping travel behavior in halal tourism.

Justification for the Adapted Framework

The model adopted in this study, in Figure 1, builds on and improves the original model developed by Pillai and Sivathanu (2020) by making it more culturally focused and applicable to the Halal tourism setting. It changes the focus from general chatbot use to one that better understands what Muslim users need and care about. The first most important reason for transforming the model is to shift the priority to user behaviour and environmental factors so that people can think carefully about their decisions using personal and cultural values.

This shift is reflected in removing the Stickiness to Traditional Travel Agents (STT) variable, since it is more universal to the travel environment. Halal tourism is more about whether a chatbot supports religious and cultural needs, not whether users are used to it. The model is improved by adding cultural compatibility (CCO) since it acknowledges that Muslim users tend to accept what they see as a system that does not undermine their religious beliefs, language, and norms, which the original model failed to consider. It is also aligned with previous studies on the role of culture in technology use (Alalwan, 2020), highlighting that people from different cultures adopt technologies differently.

Also, the modified model moves the adoption intention (AIN) out of the outcome and to a mediating relationship. This is in line with other well-known behavioural models such as TAM (Davis, 1989) and UTAUT (Venkatesh et al., 2003), which state that intention plays a central role in linking user perceptions (such as trust or ease of use) to actual usage behaviour. This study critically resolves one of the significant limitations associated with the original model. This revised framework provides a more accurate and culturally sensitive explanation of chatbot adoption in the halal tourism sector.

Research Framework

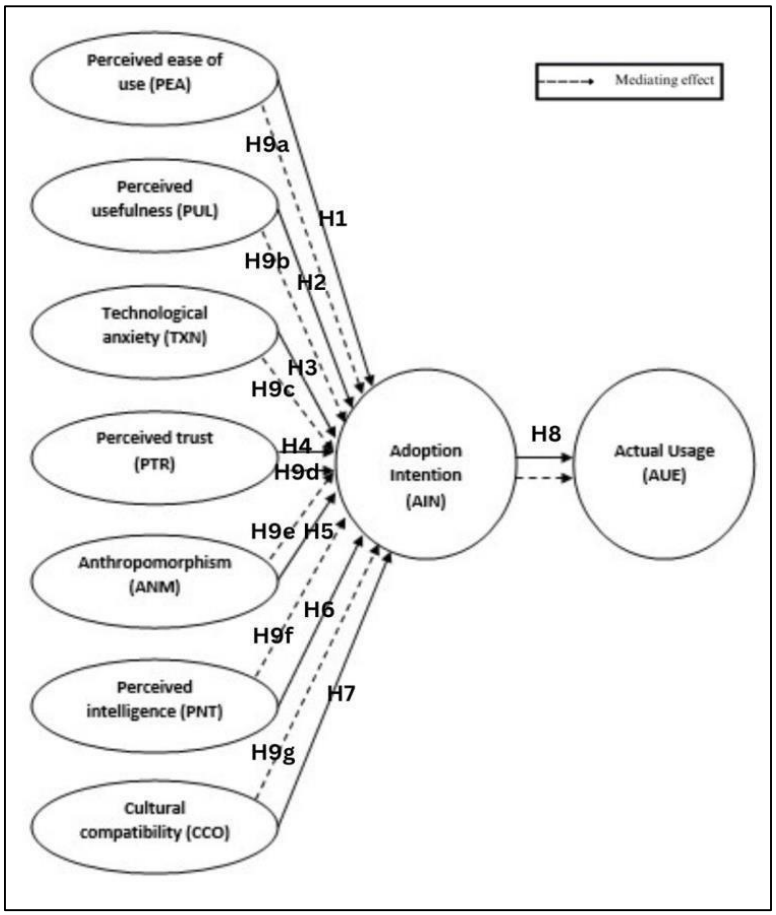


Figure 1: Proposed Research Model

Hypothesis Proposition

Based on the Technology Acceptance Model (TAM), the research proposes that user Adoption Intention is determined positively by their perceptions of the AI chatbot, like ease of use, usefulness, trust, intelligence, and cultural compatibility, and this intention leads to the actual use of the chatbot in the context of Halal tourism. This leads to the following hypotheses:

PEA affects the AIN of chatbots for tourism

Users perceive the chatbot as easy to use when it is developed with simplicity, intuitiveness, and user-friendliness. A chatbot is likely to interact more with Muslim customers about Halal tourism, depending on

whether it is easy to engage and navigate and in terms of easy understanding of the languages it is using. According to the Technology Acceptance Model (TAM), the intention to accept technology is affected by ease of use, which is essential (Davis, 1989).

PUL affects the AIN of chatbots for tourism

Users see a chatbot as applicable when it helps them plan their trips better by giving reliable and Halal-related information. In case Muslim visitors find out they can use a chatbot to find Halal food, places to pray, and services that can be used without going against Shariah, the travellers will tend to use chatbots. Past studies have shown a strong relationship between usefulness and technology acceptance (Sumarjan et al., 2023).

TNX negatively affects the AIN of chatbots for tourism

Technological anxiety refers to the fear people experience when encountering new technologies. This is highly applicable to people who are not well acquainted with Artificial Intelligence or those who are older travellers. Studies prove that when levels of anxiety are high, there is less likelihood of using digital tools (Meuter et al., 2003).

PTR affects the AIN of chatbots for tourism

Trust is crucial, especially for Muslim users who find services that comply with halal requirements and support faith-based travel decisions. If the chatbot can always give factual and appropriate information in Islamic situations, the chances of users believing and accepting it will increase. The assumption that trust plays a significant role in the willingness to use Artificial Intelligence in the travel and hospitality industry has been supported by previous research, including the study by Sumarjan et al. (2023).

ANM affects the AIN of chatbots for tourism

Anthropomorphism refers to how a chatbot resembles humans based on the tone, the behaviour, and how it interacts with people. Friendly and conversational chatbots will likely establish emotional ties with users and maintain contact between them. It has been reported that anthropomorphism enhances comfort and trust during user interactions (Gatzioufa & Saprikis, 2023).

PNT affects the AIN of chatbots for tourism

The perceived intelligence capabilities of the chatbot include how the user judges the intelligence of the chatbot, the responsiveness of the chatbot, and its ability to come up with helpful responses. Muslim visitors prefer using these chatbots since they can learn all the Islamic practices. Chatbots, which are capable of being intelligent, are more acceptable to users (Pillai & Sivathanu, 2020).

CCO affects the AIN of chatbots for tourism

Cultural compatibility indicates the level to which the chatbot aligns with its users' cultural and religious values. This involves the appropriate language, delivery of Halal results, and removing any non-Halal sources. When users find the system matches their religious expectations, they are more ready to use it (Sumarjan et al., 2023).

The AIN influences the AUE of chatbots for tourism

Both the TAM and UTAUT models suggest that intention is one of the significant determinants of usage behaviour. When Muslim travellers have a positive experience with a chatbot, they are more willing to utilise it to access real-time halal information while travelling.

Adoption intention (AIN) mediates the relationship between perceived ease of use (PEA) and actual usage (AUE).

Adoption intention (AIN) mediates the relationship between perceived usefulness (PUL) and actual usage (AUE).

Adoption intention (AIN) mediates the relationship between technological anxiety (TNX) and actual usage (AUE).

Adoption intention (AIN) mediates the relationship between perceived trust (PTR) and actual usage (AUE).

Adoption intention (AIN) mediates the relationship between anthropomorphism (ANM) and actual usage (AUE).

Adoption intention (AIN) mediates the relationship between perceived intelligence (PNT) and actual usage (AUE).

Adoption intention (AIN) mediates the relationship between cultural compatibility (CCO) and actual usage (AUE).

METHODOLOGY

Research Design

This research employed a quantitative research design since it aimed to investigate the role of AI chatbots in providing information on Halal tourism to Muslim travellers. A survey was chosen as the primary data collection method, and responses were gathered using a Google Form questionnaire. The questionnaire was shared with respondents via a QR code and a web link shared online. Upon clicking the link, participants were directed to the form, which was user-friendly and easily accessible on both mobile phones and computers.

The questionnaire was prepared with several variables, including perceived ease of use (PEA), perceived usefulness (PUL), technological anxiety (TNX), perceived trust (PTR), anthropomorphism (ANM), perceived intelligence (PNT) and cultural compatibility (CCO) as independent variables. The mediating variable was the adoption intention (AIN), whereas the dependent variable was actual usage (AUE). The measuring scale of all the items was on a 5-point Likert scale, which captures levels of agreement, from "strongly disagree" to "strongly agree". In addition to examining direct relationships, this study employed mediation analysis to determine whether actual usage (AUE) is influenced by adoption intention (AIN), which acts as a psychological mediating mechanism explaining the link between user perceptions and actual usage. Mediation analysis also helps improve existing theories like the Technology Acceptance Model (TAM), by showing that intention significantly influences user perceptions of real actions.

Sample Size / Population

This study primarily aims at Muslim travellers, especially young adults, because they are more familiar with using technology such as AI chatbots when planning their trips. This study examines how AI chatbots can help them find halal tourism information. All participants were Muslims aged 18 years or older. Adults are more likely to travel independently and can provide reliable and thoughtful answers based on their experiences. The age choices in the questionnaire included groups such as 18 to 61 and above, so the researcher could understand how different age groups use technology while travelling. Second, participants must have used technology for tourism, such as searching for halal food, booking hotels, checking prayer times, or finding prayer places. They were also asked how long they have been using technology for travel, with answers like "less than 6 months to more than 1 year." This helps to determine their familiarity with using digital tools.

Most importantly, they must have used an AI chatbot, such as ChatGPT, Gemini, or HalalTrip, to obtain information on halal tourism. This means that they used the chatbot to search for halal restaurants, Muslim-friendly destinations, or other Islamic travel services before or during their trip. Sampling explicitly targeted individuals with experience using AI chatbots for halal tourism purposes. By focusing only on people who had used this technology, the researcher ensured that the participants could provide answers based on their real experiences. According to CEICdata.com (2024), Melaka recorded approximately 15.56 million domestic visitor arrivals in 2023. As many domestic travellers in Malaysia are Muslims, it can be assumed that many of these visitors were Muslim travellers. Therefore, Melaka is a suitable location for studying chatbots in halal tourism. Based on Krejcie and Morgan's (1970) sample size table, 384 respondents were needed to achieve a 95% confidence level with a 5% margin of error. In this study, only 308 responses were included in the analysis,

as the remaining 76 participants had never used the chatbot and could not provide relevant feedback. This is supported by previous studies that focused only on users with experience in technology (Siyal et al., 2019). Although the sample size was slightly below the recommended number, the responses collected were still helpful in drawing valid conclusions.

Instrument Development

The survey instrument employed in this study consisted of ten parts, including demographic, independent, mediating, and dependent variables. The demographic data in the first section included age, gender, profession, and previous experience with tourism technologies. Such questions assisted the researcher in knowing the profile of those who took part and how comfortable or familiar they felt with technology use during travel.

The following seven sections measure the independent variables. Items measuring perceived ease of use (PEA) and perceived usefulness (PUL) were adapted from Davis (1989), assessing the chatbot's convenience and usefulness in helping users access halal tourism information. Technological anxiety (TNX) items, derived from Meuter et al. (2003), captured any distress or uneasiness felt by users when interacting with AI. The perceived trust (PTR) section, referencing McKnight et al. (2002), evaluated the chatbot's credibility, honesty, and perceived safety. Items for anthropomorphism (ANM) were modified from Lu et al. (2019), which assessed how human-like the chatbot appeared in tone and personality. Perceived intelligence (PNT) was measured using items based on Bartneck et al. (2009) to determine the perceived smartness and accuracy of the chatbot. Finally, cultural compatibility (CCO) items, drawn from Iskender et al. (2022), examined whether the chatbot's content and interaction aligned with Muslim users' cultural and religious values.

The sample of each of these constructs was taken from validated sources and adapted to ensure reliability and consistency. These questions used a 5-point Likert scale, where (1) represented strongly disagree and (5) represented strongly agree. The last two sections focus on the mediating and dependent variables. The questions for adoption intention (AIN), adapted from Kaushik et al. (2015), asked how willing the participants were to use the AI chatbot in the future. The actual usage (AUE) section, adapted from Lin and Huang (2008), measured how often participants used the chatbot to obtain halal tourism information. These items helped to determine how users' opinions lead to their intention and how that intention leads to real actions. According to the study's framework, AIN acts as a mediator between the independent variables and AUE, reflecting a deeper understanding of the technology adoption process among Muslim travellers.

Table 1: List of Questionnaire Items for Each Construct

Item	Question	Adapted From
PEA (Perceived ease of use)	I find it easy to get the AI chatbot to do what I want when looking for halal travel services	(Davis, 1989)
	My interaction with the AI chatbot is easy for me to understand	
	Overall, I find the AI chatbot easy to plan my Muslim-friendly trip.	
PUL (Perceived usefulness)	AI chatbots improve the way I plan my halal-friendly trips as a Muslim traveller.	(Davis, 1989)
	AI chatbot enables me to find halal tourism information more quickly and efficiently.	
	Overall, I find the AI chatbot is useful in supporting my travel needs as a Muslim traveller.	
TNX (Technological anxiety)	I feel apprehensive about using AI chatbots to find halal tourism information.	(Meuter et al., 2003)
	I worry that I might damage or misuse something when using AI chatbots.	
	The technological terms used by AI chatbots are confusing and difficult for me to understand	
PTR (Perceived trust)	I believe the AI chatbot is designed to care about the needs of Muslim travellers.	(McKnight et al., 2002)
	I trust that the chatbot will consistently provide accurate and reliable information	

	I believe the AI chatbot performs its task professionally in serving Muslim travellers.	
ANM (Anthropomorphism)	I feel that the AI chatbot responds to me like a real person would	(Lu et al., 2019)
	Interacting with the AI chatbot feels like having a conversation with a human	
	I sometimes forget that I interact with a machine, not a person.	
PNT (Perceived intelligence)	I feel that AI chatbot is knowledgeable about halal tourism services.	(Bartneck et al., 2009)
	I feel that AI chatbot is responsible when responding to questions related to Islamic travel needs.	
	I feel that the AI chatbot is intelligent and capable of assisting Muslim travellers.	
	I feel that the AI chatbot is intelligent and capable of assisting Muslim travellers.	
Item	**Question**	**Adapted From**
CCO (Cultural compatibility)	I feel that the chatbot understands and respects my identity as a Muslim traveller.	(Iskender et al., 2022)
	The language and tone used by the chatbot are respectful to Islamic cultural norms.	
	The chatbot avoids recommending places or services that are inappropriate in Islamic culture.	
AIN (Adoption intention)	I intend to use AI chatbots to help plan my halal-friendly trips in the future.	(Kaushik et al., 2015)
	I plan to use AI chatbots when searching for Muslim- friendly tourism services.	
	In my upcoming trips, I expect to rely on AI chatbots for Islamic travel needs.	
AUE (Actual usage)	I frequently use AI chatbots to search for halal tourism information.	(Lin & Huang, 2008)
	I regularly use AI chatbots to get recommendations on Muslim-friendly services (e.g., halal food, prayer spaces)	
	I use AI chatbots as part of my travel planning routine to ensure halal compliance.	

Pilot Test

To check whether the questions in the questionnaire were straightforward and easy to understand, a pilot study was conducted with 30 Muslim travellers and students, following the suggestion by Browne (1995). The main goal was to ensure the questions were simple and suitable for the people who would answer them. Based on the feedback, some questions were unclear, and a few words needed more straightforward explanations. After receiving this feedback, the questionnaire was improved to make it easier to read and understand. Data from the pilot study were omitted from the final analysis to maintain the accuracy and reliability of the primary research results.

Reliability Test

A reliability analysis was conducted using Cronbach's alpha, which is a common method to check whether the questions in each section of the questionnaire are consistent and measure what they are supposed to measure. According to Nunnally (1978), a value of 0.70 or above is acceptable for research. This study used data from a pilot test to check the reliability of items measuring several constructs, including perceived ease of use, perceived usefulness, technological anxiety, trust, anthropomorphism, perceived intelligence, cultural compatibility, adoption intention, and actual usage. The results showed a Cronbach's alpha value of 0.965, indicating significant internal consistency. This means that the questionnaire items were reliable and suitable for use in the actual data collection in the main study.

Data Collection

This study adopts a quantitative method by distributing an online survey to Muslim travellers with experience or interest in using AI chatbots to obtain information related to halal tourism. The survey was created using Google Forms and was distributed via social media platforms, WhatsApp communities, and other public channels. To improve accessibility, the questionnaire was made available in two formats: a direct link and a QR code. Additionally, during ongoing events, the researcher provided the QR code on-site at popular traveller locations such as Jonker Walk and Bandar Hilir, Melaka, to reach Muslim travellers directly and encourage their participation in the study.

A disclaimer was included at the beginning of the questionnaire to ensure that the data collected were relevant to the study's focus on Halal tourism information. The disclaimer informed respondents that this study aimed to investigate using AI chatbots specifically to access halal travel-related information. Respondents were instructed to proceed only if they had prior experience or a genuine interest in using AI chatbots for such purposes. During field data collection at the traveller sites, the researcher explained this context to potential respondents before they scanned the QR code or received a survey link. This approach ensured that participants fully understood the scope of the study and that only those with relevant experience or interest participated, thereby enhancing the validity and accuracy of the collected data. The target population consisted of individuals who had used or explored AI chatbot technology in the context of halal tourism. The researcher ensured the participants could answer the questionnaire based on real or relevant experiences, making the data more practical and aligned with the research objectives. The questionnaire was divided into two sections: Section A collected demographic data such as age, gender, and occupation of the respondents. Section B includes items measuring the main constructs of the study: perceived ease of use, perceived usefulness, technological anxiety, perceived trust, anthropomorphism, perceived intelligence, cultural compatibility, adoption intention, and actual usage. All items in Section B used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) to assess respondents' level of agreement with various statements.

For instance, perceived ease of use evaluated whether the chatbot was easy to operate and understand, whereas perceived usefulness captured how helpful the chatbot was in facilitating halal-friendly travel planning. Technological anxiety refers to any fear or unease associated with using AI technology. Perceived trust measures confidence in the reliability and sensitivity of chatbots to Muslim travel needs. Anthropomorphism reflects the human-like nature of the chatbot interaction. Perceived intelligence assesses a chatbot's ability to provide knowledgeable responses that are aligned with Islamic travel requirements. Cultural compatibility refers to how well the chatbot respects Islamic values, ensuring it does not suggest inappropriate content. Finally, adoption intention and actual usage measured the respondents' willingness and frequency of using AI chatbots for halal tourism purposes.

Data Analysis

This study used partial least squares structural equation modelling (PLS-SEM) to analyse the data. The analysis was performed using WarpPLS version 8.0, which is suitable for complex models and can detect linear and nonlinear relationships between variables. The model in this study includes nine variables and 15 hypotheses (H1–H8 and H9a– H9g). The seven independent variables were ease of use (PEA), perceived usefulness (PUL), technological anxiety (TNX), perceived trust (PTR), anthropomorphism (ANM), perceived intelligence (PNT), and cultural compatibility (CCO). The mediating variable was adoption intention (AIN), and the dependent variable was actual usage (AUE).

The analysis was performed in two stages. In the first stage, the measurement model was tested to determine the reliability and validity of the questionnaire items. This includes checking outer loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and the variance inflation factor (VIF). All values met the required standards, indicating that the items were reliable and valid, and there were no multicollinearity issues.

In the second stage, the structural model was tested to determine the strength and significance of the relationships between the variables. This includes examining the path coefficients, p-values, R-squared (R^2), Q-squared (Q^2),

and effect size (f^2). WarpPLS also allows the model to detect any nonlinear effects in relationships. A mediation analysis was conducted to determine whether the independent variables indirectly affected actual usage (AUE) through adoption intention (AIN). As this study aims to fill the gap in Pillai and Sivathanu's (2020) model, it focuses only on full mediation. Therefore, direct paths from the independent variables to AUE were not included, and only indirect relationships through AIN were analysed.

FINDINGS

Respondent Profile

This research employed partial least squares structural equation modelling (PLS-SEM) analysis using WarpPLS software to interpret the two-stage data. The demographic breakdown provided valuable data on respondents accessing halal tourism information using AI Chatbots. This study applied a descriptive method and frequency and percentage analysis to explore the application of AI chatbots in providing Halal Tourism Information, including Halal food options, prayer facilities and Shariah-compliant services. Demographic data (Table 3) were gathered by studying respondent profiles, with 73% (308 respondents) confirming that they had used AI chatbots such as ChatGPT, Gemini, or the HalalTrip App.

Table 3: Demographic characteristics (n=308)

Item	Categories	Frequency	Percent (%)
Have you used AI chatbots	NO.	14	3.3
(like ChatGPT, Gemini,	YES.	308	73.0
HalalTrip) to get Halal			
Tourism information			
Age	18 -20	50	11.8
	21-30	168	39.8
	31-40	59	14.0
	41-50	20	4.7
	51-60	10	2.4
	61 and above	1	.2
Gender	Male	162	38.4
	Female	146	34.6
Item	**Categories**	**Frequency**	**Percent (%)**
Occupation	Student	111	26.3
	Employees: Full-time	139	32.9
	Employees: Part-time	22	5.2
	Self-employed	19	4.5
	Unemployed	11	2.6
	Retired	6	1.4
Usage of any kind of technology for tourism purpose	Less than 6 months	118	28.0
	6-12 months	108	25.6
	1 year and above	82	19.4

The sample size mainly consisted of young adults, with the age category of 21-30 years old, which was the largest group at (39.8%), and others included the age category of 18-20 years at (11.8%) and 31-40 years at (14%). The gender distribution was quite even, with 38.4 percent male and 34.6 percent female responses, thus showing widespread technology use among both genders. Regarding occupation, 32.9 percent were full-time employees, and 26.3 percent were students. AI was relied upon more by individuals with a regular income from a job and the younger generation. Other occupations that comprise smaller percentages of the sample include part-time workers, self-employed individuals, and retired people. Concerning the previously available technological use in tourism, most users had just begun to use these tools (28% less than 6 months, 25.6% 6-12 months). The remaining 19.4% of the respondents had more than a year of experience. This shows the emerging trend of AI technology in making traveller choices, especially in halal tourism. These findings help us understand

how people use digital tools for halal tourism. The findings indicate that future AI-based tourism platforms could be designed to suit the needs of younger users, particularly Muslims, students, and the working-class population. A more extensive application of such tools can allow tourism stakeholders to expand halal-friendly services and support inclusive Shariah-compliant travel experiences through digital tools.

These findings will be helpful for developers and tourism planners who want to create digital tools that adhere to Islamic values. As younger and working Muslims are starting to use AI for travel, it is important to ensure that the information provided is correct and suits their needs. This also provides an opportunity to improve halal tourism through modern technology.

Descriptive Analysis

Table 4 presents a descriptive report on the constructs, based on the responses of 308 Muslim travellers who have previously used AI chatbots to gather information about halal tourism. A five-point Likert questionnaire was used to rate the constructions on a scale of 1 to 5 (strongly disagree to strongly agree). The findings revealed that the mean score for PEA was 4.13, significantly influencing adoption intention, supporting the Technology Acceptance Model (TAM) by Davis (1989). Respondents generally agreed with statements like PEA1 ("I find it easy to get the AI chatbot to do what I want when looking for Halal travel services") and PEA3 ("Overall, I find the AI chatbot easy to use for planning my Muslim-friendly trip."). This indicates that when Muslim travellers find AI chatbots intuitive and simple to interact with, they are more likely to use them as reliable tools in Halal travel. UL, with a mean score of 4.21, also demonstrated a strong positive effect on adoption intention, reinforcing the core idea from Davis (1989) that users are more inclined to adopt a system that enhances their task performance. Participants responded positively to items such as PUL1 ("AI chatbot improves the way I plan my Halal-friendly trips as a Muslim traveller") and PUL3 ("I find the AI chatbot useful in supporting my travel needs as a Muslim traveller.") These results show that Muslim travellers value AI chatbots that effectively assist in organising trips that comply with Islamic values.

Table 4: Descriptive Analysis

Items	Code	1	2	3	4	5	Mean
Perceived Ease of Use	**PEA**						**4.13**
I find it easy to get the AI chatbot to do what I want when looking for halal travel services	PEA1	6	22	25	123	132	
My interaction with the AI chatbot is easy for me understand	PEA2	18	6	24	138	122	
Overall, I find the AI chatbot easy to use for planning my Muslim-friendly trip	PEA3	15	8	30	119	136	
Perceived Usefulness	**PUL**	**1**	**2**	**3**	**4**	**5**	**4.21**
AI chatbots improves the way I plan my halal-friendly trips as a Muslim traveller	PUL1	6	18	28	104	152	
AI chatbot enables me to find halal tourism information more quickly and efficiency	PUL2	16	6	24	122	140	
Overall, I find the AI chatbot useful in supporting my travel needs as a Muslim traveller	PUL3	16	7	24	105	156	
Technological Anxiety	**TNX**	**1**	**2**	**3**	**4**	**5**	**2.87**
I feel apprehensive about using AI chatbots to find halal tourism information	TNX1	54	98	45	57	54	
I worry that I might do something wrong when using AI chatbots	TNX2	65	70	53	41	79	
The words used by AI chatbots are confusing and hard for me to understand.	TNX3	58	96	52	71	31	
Perceived Trust	**PTR**	**1**	**2**	**3**	**4**	**5**	**4.09**
I believe the AI chatbots is designed to care about the needs of Muslim travellers	PTR1	6	25	37	103	137	
I trust that the chatbots will consistently provide accurate and reliable information	PTR2	15	17	37	104	135	

I believe that the AI chatbots performs its task professionally in serving Muslim travellers	PTR3	14	9	33	127	125	
I believe the AI chatbots is designed to care about the needs of Muslim travellers	PTR1	6	25	37	103	137	
Anthropomorphism	**ANM**	**1**	**2**	**3**	**4**	**5**	**4.01**
I feel that the AI chatbots responds to me like a real person would	ANM 1	5	23	42	125	113	
Interacting with the AI chatbots feels like having a conversation with a human	ANM 2	16	14	40	132	106	
I sometimes forget that I am interacting with a software, not a person	ANM 3	18	16	44	88	142	
I feel that the AI chatbots responds to me like a real person would	ANM 1	5	23	42	125	113	
Perceived Intelligence	**PNT**	**1**	**2**	**3**	**4**	**5**	**4.10**
I feel that AI chatbot is knowledgeable about halal tourism services	PNT1	4	19	36	128	121	
I feel that AI chatbot is responsible when responding to questions related to Islamic travel needs	PNT2	18	10	41	95	144	
I feel that the AI chatbot is intelligent and capable of assisting Muslim travellers	PNT3	5	21	34	129	119	
I feel that AI chatbot is knowledgeable about halal tourism services	PNT4	4	19	36	128	121	
Cultural Compatibility	**CCO**	**1**	**2**	**3**	**4**	**5**	**4.05**
I feel that the chatbot understands and respects my identity as a Muslim traveller	CCO1	17	8	40	128	115	
The language and tone used by the chatbot are respectful to Islamic cultural norms	CCO2	16	9	36	129	118	
The chatbot avoid recommending places or services that are inappropriate in Islamic culture	CCO3	3	25	36	128	116	
Adoption Intention	**AIN**	**1**	**2**	**3**	**4**	**5**	**4.11**
I intend to use AI chatbots to help plan my halal-friendly trips in the future	AIN1	19	4	31	126	128	
I plan to use AI chatbots when searching for Muslim-friendly tourism services	AIN2	16	5	30	140	117	
I expect to rely on AI chatbots for Islamic travel needs in my upcoming trips	AIN3	3	17	41	124	123	
Actual Usage	**AUE**	**1**	**2**	**3**	**4**	**5**	**4.08**
I frequently use AI chatbots to search for halal tourism information	AUE1	4	22	39	128	115	
I regularly use AI chatbots to get recommendations on Muslim-friendly services (e.g., halal food, prayer spaces)	AUE2	6	20	37	100	145	
I use AI chatbots as part of my travel planning routine to ensure halal compliance	AUE3	18	8	36	132	114	

The study found that TNX, with the lowest mean of 2.87, negatively affected AIN, aligning with Meuter et al. (2003), who stated that discomfort or fear of using technology can reduce willingness to adopt it. Items such as TNX1 ("I feel apprehensive about using AI chatbots to find halal tourism information") and TNX3 ("Technological terms used by AI chatbots are confusing and difficult for me to understand") received moderate agreement, indicating that anxiety can hinder Muslim users from confidently using AI tools in travel contexts. PTR positively influenced AIN, with a high average score (4.09). This supports the findings of McKnight et al. (2002), who highlighted the importance of trust in technology acceptance. For example, the item PTR2 ("I trust that the chatbots will consistently provide accurate and reliable information") shows that users are more likely to use the chatbot when they believe it provides trustworthy information and understands Muslim users' needs. ANM recorded the highest mean score of 4.01 and significantly contributed to AIN, aligning with Lu et al. (2019), who suggested that human-like interaction increases user comfort. An item such as ANM2 ("Interacting

with the AI chatbot feels like having a conversation with a human") received strong agreement from the respondents. This indicates that Muslim users are more likely to engage with AI chatbots when the interaction feels more natural and human-like.

The findings indicate that PNT positively influenced AIN, with a mean score of 4.10. This supports Bartneck et al. 's(2009) association of PNT with user satisfaction. Respondents agreed with items such as PNT3 ("I feel that the AI chatbot is intelligent and capable of assisting Muslim travellers"), suggesting that Muslim travellers value AI systems that can intelligently understand and cater to their travel needs. CCO strongly influenced AIN, with an average score of 4.05, supporting Iskender et al. (2022), who emphasised that cultural compatibility enhances user acceptance of AI systems. A statement such as CCO2 ("The language and tone used by the chatbot are respectful to Islamic cultural norms") received strong agreement. This indicates that Muslim users are more likely to adopt AI chatbots that align with their religious and cultural values. AIN emerged as a strong mediator of actual usage, with a mean score of 4.11, aligning with Kaushik et al. (2015), who proposed that user intention reliably predicts behaviour. Responses to items such as AIN2 ("I plan to use AI chatbots when searching for Muslim-friendly tourism services") received strong agreement, confirming that a higher intention often translates into continued usage.

Lastly, AUE recorded a score of 4.08 and was strongly influenced by AIN, consistent with the Theory of Reasoned Action (Lin & Huang, 2008), which suggests that intention leads to behaviour. Items such as AUE2 ("I regularly use AI chatbots to get recommendations on Muslim-friendly services, e.g., halal food, prayer spaces") and AUE3 ("I use AI chatbots as part of my travel planning routine to ensure Halal compliance") indicate that many Muslim travellers not only intend to use these chatbots but have already integrated them into their travel planning habits.

Measurement Model

In this study, the measurement model was evaluated (Table 5) by employing Warp partial least squares structural equation modelling (PLS-SEM) because of its ability to assess the quality of the data and the construct relationships. The evaluation was based on the set criteria outlined to measure five major aspects: outer loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and variance inflation factor (VIF). Hair et al. (2010) state that outer loadings should be at least 0.50 to indicate acceptable reliability. In this study, all outer loadings exceeded 0.80, which means that every indicator sufficiently confirmed the dependent construct and had high indicator reliability. All constructions had Cronbach's alpha values greater than 0.70, well above the thresholds recommended by Nunnally and Bernstein (1994). This indicates a high level of internal consistency among the items. Similarly, the composite reliability (CR) values were recorded between 0.938 and 0.961, which exceeds the 0.70 threshold proposed by Fornell and Larcker (1981), indicating that each construct demonstrated adequate reliability.

In the case of convergent validity, the AVE values in this study ranged between 0.835 and 0.892 and exceeded 0.50, as Hair et al. (2010) suggested. This shows that each construction explains much variation in its related items. In addition, the variance inflation factor (VIF) values were all below 10, which follows the guideline by Hair et al. (2010), meaning there is no issue with multicollinearity in the model. Overall, these results suggest that the measurement model meets the required standards for reliability and validity, making it a solid foundation for the next step of structural analysis.

Table 5: Measurement model

Variables	Code of items	Outer loading	VIF	α	CR	AVE
Perceived Ease of Use	PEA1	0.935	6.94	0.918	0.948	0.859
	PEA2	0.916				
	PEA3	0.930				
Perceived Usefulness	PUL1	0.919	8.251	0.919	0.949	0.861
	PUL2	0.922				
	PUL3	0.942				

Technological Anxiety	TNX1	0.948	1.103	0.940	0.961	0.892
	TNX2	0.945				
	TNX3	0.940				
Perceived Trust	PTR1	0.933	5.274	0.931	0.956	0.879
	PTR2	0.947				
	PTR3	0.933				
Anthropomorphism	ANM1	0.926	3.813	0.905	0.941	0.841
	ANM2	0.921				
	ANM3	0.903				
Perceived Intelligence	PNT1	0.910	6.898	0.912	0.945	0.851
	PNT2	0.934				
	PNT3	0.922				
Cultural Compatibility	CCO1	0.910	8.228	0.911	0.944	0.849
	CCO2	0.940				
	CCO3	0.914				
Adoption Intention	AIN1	0.929	8.658	0.902	0.939	0.836
	AIN2	0.918				
	AIN3	0.895				
Actual Usage	AUE1	0.904	5.361	0.901	0.938	0.835
	AUE2	0.921				
	AUE3	0.916				

Notes: VIF=Variance Inflation Factor, α=Cronbach Alpha, CR=Composite Reliability, AVE=Average Variance Extracted

Discriminant Validity

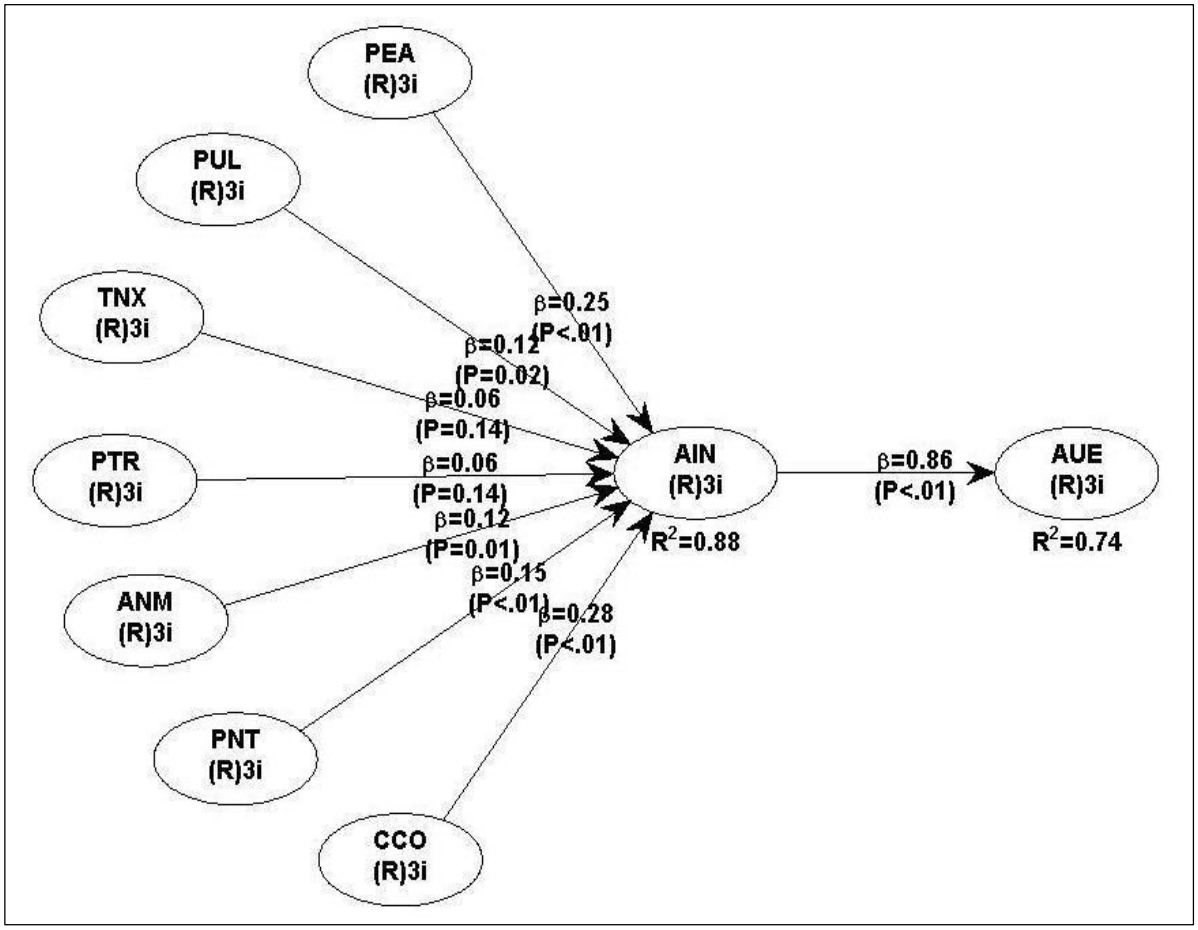
Discriminant validity means that each variable in the study should be different from and not like other variables. The Fornell-Larcker criterion was used to verify this. In this method, the diagonal values in the table show the square roots of the AVE for each variable. These values must be higher than the numbers around them, which are the correlations with the other variables.

The results (Table 6) show that all the diagonal values are higher than those of their rows and columns. For example, the AVE value for perceived ease of use (PEA) is 0.927, which is higher than its correlation with perceived usefulness (0.907) and adoption intention (0.871). Another example is technological anxiety (TNX), with an AVE of 0.945, which is also higher than its correlation with other variables such as trust (0.125) and usefulness (0.098). This pattern was observed for all variables, such as PTR, ANM, PNT, CCO, AIN, and AUE. This means that each variable is more related to its questions than to other variables. Therefore, we can conclude that discriminant validity is confirmed in this study (Hair et al., 2010).

Table 6: Discriminant validity

Fornell-Larcker criterion	PEA	PUL	TNX	PTR	ANM	PNT	CCO	AIN	AUE
PEA	0.927								
PUL	0.907	0.928							
TNX	-0.012	0.098	0.945						
PTR	0.797	0.838	0.125	0.938					
ANM	0.737	0.760	0.028	0.795	0.917				
PNT	0.798	0.825	0.059	0.849	0.806	0.922			
CCO	0.832	0.857	0.044	0.834	0.823	0.898	0.921		
AIN	0.871	0.882	0.047	0.845	0.825	0.872	0.901	0.914	
AUE	0.804	0.830	0.087	0.840	0.778	0.859	0.859	0.854	0.914

Structural Model



Source: Authors (2025)

Figure 2: Hypothesis test result

This study evaluated the structural model using several key indicators to understand its effectiveness. These include R-squared (R^2), Q-squared (Q^2), path coefficients (β), effect sizes (f^2), and the variance inflation factor (VIF). According to Chin (1998), R^2 values of 0.67, 0.33, and 0.19 can be considered substantial, moderate, and weak, respectively. The R^2 value for AIN was 0.882, meaning that 88.2% of the changes in AIN could be explained by the independent variables (perceived ease of use, perceived usefulness, technological anxiety, perceived trust, anthropomorphism, perceived intelligence, and cultural compatibility). The R^2 value for actual usage (AUE) was 0.737, indicating substantial explanatory power.

To determine the prediction accuracy of the model, the Q^2 values were also checked. Based on Geisser (1975), the model can predict the dependent variables if the Q^2 value is greater than 0. In this study, all Q^2 values were above 0, indicating that the model had good predictive relevance. Next, the path coefficients were examined to determine the strength and direction of the relationships between the variables. According to Hair et al. (2010), the variable that had the strongest effect on adoption intention was cultural compatibility (β = 0.280), followed by perceived ease of use (β = 0.247), and perceived intelligence (β = 0.148). Other variables, including perceived usefulness, anthropomorphism, technological anxiety, and perceived trust, also had positive but smaller effects. The link between adoption intention and actual usage was very strong, with a value of 0.859.

Finally, the effect size (f^2) was checked to understand the influence of each variable. Adoption Intention greatly affected actual usage (f^2 = 0.737), which is much higher than the 0.35 threshold for a large effect, based on Cohen (1988). Cultural compatibility (f^2 = 0.255) and perceived ease of use (f^2 = 0.219) had medium effects. The other variables had small-to-moderate effects. Overall, these results show that the model is strong and that adoption intention is an important factor that explains whether Muslim travellers will use AI chatbots for halal tourism.

Hypothesis Model

Table 7: The hypothesis test result

Hypotheses	Path Coefficient (β)	P-values	Decision
H1. PEA - AIN	0.247	<0.001	Supported
H2. PUL - AIN	0.117	0.018	Supported
H3. TNX - AIN	0.061	0.142	Not supported
H4. PTR - AIN	0.060	0.143	Not supported
H5. ANM - AIN	0.125	0.013	Supported
H6. PNT - AIN	0.148	0.004	Supported
H7. CCO - AIN	0.280	<0.001	Supported
H8. AIN- AUE	0.859	<0.001	Supported
H9a. PEA – AIN - AUE	0.212	<0.001	Supported
H9b. PUL – AIN - AUE	0.101	0.006	Supported
H9c. TNX – AIN - AUE	0.052	0.097	Not Supported
H9d. PTR – AIN - AUE	0.052	0.098	Not Supported
H9e. ANM – AIN - AUE	0.107	0.004	Supported
H9f – PNT – AIN – AUE	0.127	<0.001	Supported
H9g. CCO – AIN - AUE	0.240	<0.001	Supported

Table 7 explored the factors influencing Muslim travellers' use of AI chatbots to access halal travel information. Rather than merely focusing on whether individuals intend to use chatbots, it also explores the relationships behind their usage. One key part of the study was adoption intention. The willingness of people to use the chatbot. This intention was tested to determine whether it helped explain the link between people's opinions and their actual usage.

The results revealed some clear patterns. First, people were more likely to use the chatbot if they found it easy to use (PEA-AIN) ($\beta = 0.247$, $p < 0.001$). If a tool is simple, people will want to use it. This is supported by earlier ideas from the Technology Acceptance Model (TAM), which states that ease leads to more use. Similarly, if the chatbot was seen as useful in helping users find halal food or prayer places, for example, they were more likely to intend to use it (PUL-AIN) ($\beta = 0.117$, $p = 0.018$). Based on this study, fear of technology use (TNX-AIN) did not show a significant relationship ($\beta = 0.061$, $p = 0.142$).

This means that feeling anxious about technology did not strongly affect users' intention to use it. One possible reason is that most of the respondents were already familiar with technology, so they did not feel much fear. However, Budhathoki et al. (2024) found a different result in the UK, where anxiety (ANX) had a strong negative effect on users' intention to use the system. This finding is different from theirs.

Factors such as trust in the chatbot (PTR-AIN) ($\beta = 0.060$, $p = 0.143$) did not seem to matter much in this study. This could be because trust is less important than cultural compatibility or usefulness. Interestingly, people were more open to using chatbots that felt a bit human-like (ANM-AIN) ($\beta = 0.125$, $p = 0.013$) or were perceived as intelligent (PNT-AIN) ($\beta = 0.148$, $p = 0.004$). This shows that a chatbot does not need to be functional but should feel friendly and smart. However, the most significant impact was cultural compatibility (CCO-AIN) ($\beta = 0.280$, $p < 0.001$). In other words, users were much more likely to use the chatbot if it matched their religious values and respected their culture. This is especially important for tourism.

The study also confirmed that if people planned to use the chatbot, they usually used it (AIN-AUE) ($\beta = 0.859$, $p < 0.001$). This is supported by well-known theories such as TAM and UTAUT, which state that intention leads to action. The study also tested whether this intention helps explain why people end up using the chatbot. Finding the chatbot easy to use (H9a: $\beta = 0.212$) or useful (H9b: $\beta = 0.101$) led to actual use, mainly because it increased their intention. However, fear of technology (H9c) and trust (H9d) did not show much influence, even indirectly. This hypothesis was not supported because the p-value was greater than 0.05, which matches the results of Budhathoki et al. (2024). Gefen and Straub (2005) stated that a p-value must be less than 0.05 to be considered statistically significant. This means that users' fear or worry about technology does not clearly affect their

decision to use a system. Therefore, Hypothesis H9c was not supported because there was insufficient statistical evidence to prove the relationship between the two variables.

Other factors, such as the chatbot feeling human-like (H9e: $\beta = 0.107$), intelligent (H9f: $\beta = 0.127$), and culturally appropriate (H9g: $\beta = 0.240$), had strong indirect effects on actual usage through the users' intention. In this study, cultural compatibility had the greatest impact. In short, this study shows that while design and functionality matter, what drives Muslim travellers to use AI chatbots is whether those tools feel right for their cultural and religious needs.

DISCUSSION

The results confirmed that ease of use, usefulness, anthropomorphism, smart responses, and cultural compatibility significantly encouraged users to try the chatbot. Among these, cultural compatibility emerged as the most influential factor. This was the main reason why users felt comfortable and motivated to engage, surpassing more general features such as usability or trust. These findings align with those of Folk et al. (2025), who found that cultural compatibility played a key role in how Muslim users perceived and accepted AI chatbots in halal tourism. The findings of this study help address the main research question of how users' views of ease of use, usefulness, trust, anxiety, intelligence, cultural compatibility, and anthropomorphism influence their actual use of chatbots in halal tourism. The results indicate that ease of use, usefulness, anthropomorphism, intelligence, and cultural compatibility all impact actual use, but only through the user's intention to use the chatbot. Among these factors, cultural compatibility had the strongest effect, followed by ease-of-use. Muslim travellers are more likely to use a chatbot if they feel that it respects their cultural and religious values. This is supported by Soonsan and Jumani (2024), who found that services that match Islamic needs, such as halal food and prayer facilities, increase Muslim travellers' interest and comfort. Overall, this study emphasises that in faith-based tourism, respectful and culturally appropriate design plays a crucial role in promoting long-term use.

The study indicates that the intention to use chatbots is crucial in determining whether halal tourism users will utilise them. A strong correlation was found between users' intentions and their actual usage, demonstrating that when people genuinely plan to use a chatbot, they are very likely to follow through. This confirms ideas from previous research on technology adoption, Turner et al. (2010), which suggests that the intention to use a system is a strong predictor of actual usage behaviour. This implies that fostering a firm intention in users is more effective than emphasising features such as ease of use or usefulness. Chatbot developers should encourage positive intentions among Muslim travellers, as this leads to actual usage.

The findings of this study help expand existing technology acceptance models by showing how they apply to a cultural setting such as Halal tourism. This confirms that the core ideas from the Technology Acceptance Model, that is, how easy a system is to use and how useful it is, still play a big role in whether people intend to use it and use it (King & He, 2006). When users find a chatbot easy to use and helpful, they are more likely to want to use it. This shows that clear and useful tools are still key, even in sensitive or specific situations. One of the most important findings of this study is the strong support for the cultural compatibility hypothesis. This factor had the most significant influence on the intention to use the chatbot. The results show that respectful language, appropriate tone, and Shariah-compliant suggestions greatly matter to Muslim travellers. This confirms that even if a chatbot is easy to use and useful, people may still avoid it if it does not match their cultural or personal values. Compatibility with one's beliefs plays a key role in adopting technology. A finding supported by research shows that perceived compatibility helps drive usefulness and ease of use (Hasni et al., 2021). This highlights the need to develop new models or improve existing ones to include cultural factors when studying technology use in specific settings such as Halal tourism.

The study also found that when chatbots seem more human-like and knowledgeable, users are likelier to want to use them. This aligns with Battour et al. 's (2022) research, which highlights that culturally aware AI support significantly improves satisfaction in halal tourism. These results highlight that people now expect more than just basic help; they want smart, respectful, and culturally aware, digital support. This shows the growing importance of both the emotional and social aspects of user experience, especially in the context of faith-based tourism. Interestingly, this study found that both technological anxiety and perceived trust did not strongly impact the intention to use chatbots. One possible reason is that most respondents were young adults (aged 21–

30), who are usually more comfortable with technology. Their familiarity with digital tools may explain why they did not feel anxious or overly concerned about trusting chatbots.

The results of this study offer useful insights for those involved in halal tourism. As cultural compatibility has the biggest impact, Mat and Shamsuddin (2024) highlight that Islamic values, accurate Halal information, and Shariah-compliant responses should be core elements in AI chatbot design, not just optional features. Making the chatbot easy to use is also important, with simple menus, clear instructions, and language options such as Arabic and Malay to help users feel comfortable. Kayeser Fatima et al. (2024) studied how giving chatbots human-like qualities and showing perceived intelligence improves user experience. They found that chatbots designed in this manner feel friendlier, more capable, and emotionally responsive, which leads to higher satisfaction and trust. Adding personalised replies and clear halal guidance can boost user confidence. Tourism authorities, hotels, and travel agencies should work closely with developers to build AI chatbots for halal tourism, ensuring they meet religious needs such as halal food, prayer timing, and modest travel services (Battour et al., 2024). Instead of using general travel bots, they should focus on features such as verified Halal food listings, accurate prayer times, Qibla directions, and Shariah-friendly activities.

Marketing should highlight how these chatbots align with Muslim values, are easy to use, and make trip planning easier and more enjoyable. To ensure that the information is trustworthy, it is important to partner with Islamic authorities, halal certification groups, and local Muslim communities. Although trust was not a major factor in this study, it is still a basic user requirement. Since the study found that young working adults are the main users, chatbot features and promotions should be designed to suit their tech-savvy lifestyles, helping them feel confident and supported while travelling. Companies that ignore cultural values may lose out on attracting Muslim travellers and fall behind in this fast-growing industry. This highlights the need to move from general chatbot designs to those specially tailored to Muslim users.

Implications for Practice

This study shows the strong influence of cultural compatibility (CCO). Governments in Muslim-majority countries, such as Malaysia, can use this finding to improve their national tourism plans. This suggests the need for official guidelines to ensure that digital tourism tools, including chatbots, truly follow Shariah principles. This aligns with Azam et al. (2024), who emphasised that formal frameworks and Shariah-compliant designs must guide digital innovations in halal tourism to serve Muslim travellers effectively. Because perceived ease of use (PEA) strongly influences Malaysians' intention to use chatbots for travel, systems should be simple, user-friendly, and helpful. Nazri et al. (2024) found that the easier a chatbot is to use, the more likely people are to adopt it.

The findings on perceived intelligence and anthropomorphism show that Muslim travellers prefer respectful, polite, and human-like chatbots. This implies that chatbots should greet users in a manner aligned with Islamic culture, maintain a kind tone, and respond appropriately to queries regarding religion. Mat and Shamsuddin (2024) studied a framework based on Islamic principles for chatbot development, emphasising respectful greetings, tone, and response patterns consistent with Shariah values. Although perceived trust (PTR) was not a strong predictor in this study, trust remains essential, highlighting the need for chatbots to provide clear information and reliable sources in their responses (Nazri et al., 2024). The government and tourism bodies should ensure that these tools are linked to trusted Islamic organisations or Halal certification bodies so that users feel confident using them.

This study shows that chatbots should not be treated as an extra feature for the tourism industry. Tourism boards, hotels, and travel companies should consider offering digital tools to help Muslim travellers plan trips in line with their religious beliefs. Qualitative methods, such as interviews or group discussions, can uncover their concerns and specific needs (Iancu & Iancu, 2023). In addition, as Muslim travellers face different challenges in Muslim-minority countries, chatbot services may need to be adjusted by country. Jia and Chaozhi (2019) showed that in China, traveller services often fall short in addressing halal needs, such as appropriate dining, prayer space, and modesty considerations, highlighting the importance of designing chatbots tailored to each location's cultural and religious landscape. Finally, close cooperation between halal certification bodies, tourism businesses, and technology developers is needed to ensure that services follow Islamic values. Suharko et al.

(2018) demonstrate that effective Halal tourism requires institutional conformance between certification bodies and tourism providers, ensuring that partnerships align service delivery with Shariah standards. With support from the government, this could lead to the development of official halal tourism platforms, helping Muslim travellers feel more confident, comfortable, and well-guided throughout their journey.

LIMITATIONS AND FUTURE RESEARCH

This study offers insights into Muslim travellers' use of chatbots for halal tourism; however, several limitations must be acknowledged. First, although the sample size of 308 valid responses provided meaningful results, it fell short of the recommended 384 (Krejcie & Morgan, 1970), potentially limiting statistical power and generalizability. Second, the focus on Malaysian Muslim travellers, a culturally homogeneous group, restricts cross-cultural applicability, as the findings may not extend to Muslim minorities in non-Muslim-majority countries or non-Muslim travellers. Fourth, the dominance of young adults (40% aged 21–30) in the sample may have skewed the results, as this demographic's comfort with technology could explain the non-significance of technological anxiety (TNX). Fifth, the cross-sectional design captured attitudes simultaneously, neglecting how chatbot adoption evolved longitudinally. Sixth, reliance on self-reported data (via Google Forms) may have introduced response bias. Finally, this study examined only indirect effects (e.g., independent variables → adoption intention → actual usage), omitting direct relationships that could reveal nuanced influences of factors such as perceived usefulness.

Future research should build on this study by addressing its limitations and expanding its theoretical and practical contributions. First, expanding the sample size to meet the recommended thresholds and including more diverse demographics, such as older adults and Muslim travellers from non-Muslim-majority countries, would enhance generalizability and uncover potential cultural or generational differences. Comparative studies across regions (e.g., Southeast Asia vs. Europe) could further test the model's cross-cultural validity in the future. Additionally, the non-significant effects of perceived trust and technological anxiety warrant deeper investigation, possibly through qualitative interviews or experimental designs, to clarify whether these constructs are context-dependent or require refined measurements. A longitudinal approach would also provide valuable insights into how chatbot adoption evolves, moving beyond the static snapshots offered by cross-sectional data. To improve accessibility and engagement, future studies should incorporate visual aids, such as conceptual diagrams or simplified infographics, to summarize key findings. Beyond tourism, researchers should explore how these findings apply to other AI-driven services, including voice assistants and generative AI chatbots in halal e-commerce or hospitality. Finally, testing the direct and indirect effects of predictors on usage behavior could refine the model, offering a more nuanced understanding of chatbot adoption drivers. Collectively, these advancements would strengthen the theoretical framework while providing actionable insights for AI developers and halal tourism stakeholders operating in global markets.

CONCLUSION

The main goal of this study was to explore the factors that influence Muslim travellers' use of AI chatbots to find Halal tourism information. It examined how users' opinions and feelings about the chatbot affected their decision to use it, especially regarding their intention to adopt the technology. This helps fill an important gap in understanding how people accept technology in religious and culturally sensitive travel settings. This study successfully achieved this goal by creating and testing a tailored, theoretical framework. The study clearly showed that AIN plays a key role in turning user perceptions into actual ChatGPT usage. The strong link between AIN and AUE confirms that a person's willingness to use a chatbot is the most significant factor in whether or not they use it. Among all the factors tested, (CCO) had the strongest effect on AIN. This highlights the importance of AI chatbots matching Islamic values, language, and interaction styles when used by Muslim travellers. PEA and PNT were also strong predictors, indicating that users are more likely to accept easy-to-use and smart chatbots. PUL and ANM also had positive effects, suggesting that practical features and human-like qualities increase user interest. However, TNX and PTR did not have significant effects on the results. This may be because the respondents were mostly tech-savvy Muslim travellers, for whom trust and comfort with technology were already expected to be high.

This study makes an important contribution by connecting general technology acceptance theories with the unique needs of faith-based tourism. By adapting Pillai and Sivathanu's (2020) model and adding CCO as a key factor, this study offers a more accurate and culturally sensitive way to understand how Muslim travellers adopt AI chatbots in halal tourism. This creates a solid foundation for future research on using culturally aware technology. In practical terms, the findings provide helpful insights for chatbot developers and the tourism industry. This approach can improve user satisfaction, build trust, and encourage long-term use, helping the halal tourism industry fully benefit from digital technologies (Battour et al., 2025).

ETHICAL CONSIDERATION

This study received full ethical approval from the Research Ethics Committee of UiTM Melaka. All research procedures comply with institutional ethical guidelines regarding participant confidentiality, voluntary participation, and informed consent.

CONFLICT OF INTEREST

The authors declare no conflicts of interest in this research.

REFERENCES

1. Affandi, S., Ishaq, M. I., Raza, A., Talpur, Q. ul Ain, & Ahmad, R. (2025). AI assistant is my new best friend! Role of emotional disclosure, performance expectations, and intention to reuse. Journal of Retailing and Consumer Services, 82. https://doi.org/10.1016/j.jretconser.2024.104087
2. Alabed, A., Javornik, A., & Gregory-Smith, D. (2022). AI anthropomorphism and its effect on users' self-congruence and self–AI integration: A theoretical framework and research agenda. Technological Forecasting and Social Change, 182. https://doi.org/10.1016/j.techfore.2022.121786
3. Alalwan, A. A. (2020). Mobile food ordering apps: An empirical study of the factors affecting customer e-satisfaction and continued intention to reuse. International Journal of Information Management, 50, 28–44. https://doi.org/10.1016/j.ijinfomgt.2019.04.008
4. Al-Oraini, B. S. (2025). Chatbot dynamics: trust, social presence and customer satisfaction in AI-driven services. Journal of Innovative Digital Transformation. https://doi.org/10.1108/jidt-08-2024-0022
5. Althubaiti, A. (2016). Information bias in health research: Definition, pitfalls, and adjustment methods. In Journal of Multidisciplinary Healthcare (Vol. 9, pp. 211–217). Dove Medical Press Ltd. https://doi.org/10.2147/JMDH.S104807
6. Aslam, W., Ham, M., Mirza, F., Ting, D. H., & Hussain, A. (2025). Revolutionizing food ordering: predicting the dynamics of chatbot adoption in a tech-driven era. Journal of Foodservice Business Research. 1-25. https://doi.org/10.1080/15378020.2025.2468035
7. Azam, M. S., Muflih, B. K., & Al Haq, M. A. (2024). Intersection between modern technologies and halal tourism. The Journal of Muamalat and Islamic Finance Research, 16–31. https://doi.org/10.33102/jmifr.546
8. Bartneck, C., Kulić, D., Croft, E., & Zoghbi, S. (2008a). Measurement instruments for the anthropomorphism, animacy, likeability, perceived intelligence, and perceived safety of Robots. International Journal of Social Robotics, 1(1), 71–81. https://doi.org/10.1007/s12369-008-0001-3
9. Battour, M. M., Ismail, M. N., & Battor, M. (2010). Toward a halal tourism market. Tourism Analysis, 15(4), 461–470. https://doi.org/10.3727/108354210x12864727453304
10. Battour, M., Mady, K., Salaheldeen, M., Elsotouhy, M., Elbendary, I., & Boğan, E. (2022). AI-enabled technologies to assist Muslim tourists in halal-friendly tourism. Journal of Islamic Marketing, 14(5), 1291–1309. https://doi.org/10.1108/jima-01-2022-0001
11. Battour, M., Mady, K., Salaheldeen, M., Ratnasari, R. T., Sallem, R., & Al Sinawi, S. (2024a). Halal tourism and ChatGPT: An overview of current trends and Future Research Directions. Journal of Islamic Marketing, 15(12), 3464–3483. https://doi.org/10.1108/jima-11-2023-0379
12. Battour, M., Ratnasari, R. T., Ahmi, A., Sukmana, R., & Hendratmi, A. (2024). The current state of published literature on Halal Tourism and hospitality: A bibliometric review. Journal of Islamic Marketing, 15(4), 963–989. https://doi.org/10.1108/jima-02-2023-0054
13. Berakon, I., Wibowo, M. G., Nurdany, A., & Aji, H. M. (2021). An expansion of the technology

acceptance model applied to the Halal Tourism Sector. Journal of Islamic Marketing, 14(1), 289–316. https://doi.org/10.1108/jima-03-2021-0064

14. Bortko, K., Fornalczyk, K., Jankowski, J., Sulikowski, P., & Dziedziak, K. (2023). Impact of changes in chatbot's facial expressions on user attention and reaction time. PLoS ONE, 18(7 July). https://doi.org/10.1371/journal.pone.0288122
15. Browne, R. H. (1995). On the use of a pilot sample for sample size determination. Statistics in Medicine, 14(17), 1933–1940. https://doi.org/10.1002/sim.4780141709
16. Budhathoki, T., Zirar, A., Njoya, E. T., & Timsina, A. (2024). CHATGPT adoption and anxiety: A cross-country analysis utilising the unified theory of acceptance and use of technology (utaut). Studies in Higher Education, 49(5), 831–846. https://doi.org/10.1080/03075079.2024.2333937
17. Cai, D., Li, H., & Law, R. (2022). Anthropomorphism and OTA chatbot adoption: A mixed methods study. Journal of Travel & Tourism Marketing, 39(2), 228–255. https://doi.org/10.1080/10548408.2022.2061672
18. CEICdata.com. (2024). Malaysia Domestic Tourism: Number of Visitors: Melaka. Retrieved from https://www.ceicdata.com/en/malaysia/domestic-tourism/domestic-tourism- number-of-visitors-melaka
19. Chin, W.W. (1998) issues and opinion on structural equation modeling. MIS Quarterly, 22, 7-16. - references - scientific research publishing. (n.d.). Retrieved from https://www.scirp.org/reference/ReferencesPapers?ReferenceID=2126824
20. Cohen, Jack. (1988). Statistical Power Analysis for the behavioral sciences. L. Erlbaum Associates.
21. Davis, F. D. (1989a). Perceived usefulness, perceived ease of use, and user acceptance of Information Technology. MIS Quarterly, 13(3), 319. https://doi.org/10.2307/249008
22. Dekkal, M., Arcand, M., Prom Tep, S., Rajaobelina, L., & Ricard, L. (2023a). Factors affecting user trust and intention in adopting Chatbots: The moderating role of technology anxiety in Insurtech. Journal of Financial Services Marketing, 29(3), 699–728. https://doi.org/10.1057/s41264-023-00230-y
23. Folk, D. P., Wu, C., & Heine, S. J. (2025). Cultural variation in attitudes toward social chatbots. Journal of Cross-Cultural Psychology, 56(3), 219-239. https://doi.org/10.31234/osf.io/wc895_v2
24. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39. https://doi.org/10.2307/3151312
25. Gatzioufa, P., & Saprikis, V. (2022a). A literature review on users' behavioral intention toward Chatbots' adoption. Applied Computing and Informatics (ahead-of-print). https://doi.org/10.1108/aci-01-2022-0021
26. Gefen, D., & Straub, D. (2005). A practical guide to factorial validity using PLS-graph: Tutorial and annotated example. Communications of the Association for Information Systems, 16. https://doi.org/10.17705/1cais.01605
27. Geisser, S. (1975). The predictive sample reuse method with applications. Journal of the American Statistical Association, 70(350), 320. https://doi.org/10.2307/2285815
28. Hadi, Z. 'Alimul, Siregar, D. A., Wijaya, G. S., Handayani, P. W., & Harahap, N. C. (2024). The influence of transparency, anthropomorphism, and positive politeness on chatbots for service recovery in E-health applications. Cogent Social Sciences, 10(1). https://doi.org/10.1080/23311886.2024.2415534
29. Hafidz, I., Mukti, B., Zahra, Q., Naseela, I., Yudistira, D., Pratama, P., Purnama, M., Ariyani, F., Astuti, M., & Tjahyanto, A. (2024). Chatbot model development using BERT for West Sumatera halal tourism information. Halal Research Journal, 4(2), 117–131. https://doi.org/10.12962/j22759970.v4i2.1819.
30. Hair, J. F. (2010). Multivariate Data Analysis: A Global Perspective. Pearson Education. Hair, J., & Alamer, A. (2022). Partial least squares structural equation modeling (PLS-SEM) in Second language and education research: Guidelines using an applied example. Research Methods in Applied Linguistics, 1(3), 100027. https://doi.org/10.1016/j.rmal.2022.100027
31. Hasni, M. J., Farah, M. F., & Adeel, I. (2021). The technology acceptance model revisited: Empirical evidence from the tourism industry in Pakistan. Journal of Tourism Futures, 1-21. https://doi.org/10.1108/jtf-09-2021-0220.
32. Hoo, W. C., Ching, K. Y., Cheng, A. Y., Saeed, K., & Shaznie, A. (2023). An examination on the factors that influence the intention to use Chatbots in Malaysia. International Journal of Management and Sustainability, 12(3), 380–390. https://doi.org/10.18488/11.v12i3.3457
33. Iancu, I., & Iancu, B. (2023). Interacting with Chatbots later in life: A technology acceptance perspective in covid-19 pandemic situation. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.1111003

34. Isa, S. M., Chin, P. N., & Mohammad, N. U. (2018). Muslim tourist perceived value: A study on Malaysia halal tourism. Journal of Islamic Marketing, 9(2), 402–420. https://doi.org/10.1108/jima-11-2016-0083
35. Iskender, A., Sirakaya-Turk, E., Cardenas, D., & Harrill, R. (2022). Covid or void: A systematic literature review of technology adoption and acceptance in Hospitality and tourism since the breakout of covid-19. Tourism and Hospitality Research, 24(1), 95–114. https://doi.org/10.1177/14673584221133667
36. Jia, X., & Chaozhi, Z. (2019). "Halal tourism": Is it the same trend in non-Islamic destinations with Islamic destinations? Asia Pacific Journal of Tourism Research, 25(2), 189–204. https://doi.org/10.1080/10941665.2019.1687535
37. Kaushik, A. K., Agrawal, A. K., & Rahman, Z. (2015). Tourist behaviour towards self- service hotel technology adoption: Trust and subjective norm as key antecedents. Tourism Management Perspectives, 16, 278–289. https://doi.org/10.1016/j.tmp.2015.09.002
38. Kayeser Fatima, J., Khan, M. I., Bahmannia, S., Chatrath, S. K., Dale, N. F., & Johns, R. (2024). Rapport with a chatbot? the underlying role of anthropomorphism in socio-cognitive perceptions of rapport and E-word of mouth. Journal of Retailing and Consumer Services, 77, 103666. https://doi.org/10.1016/j.jretconser.2023.103666
39. Kim, J. H., Kim, J., Park, J., Kim, C., Jhang, J., & King, B. (2023). When ChatGPT gives incorrect answers: the impact of inaccurate information by generative AI on tourism decision-making. Journal of Travel Research, 64(1), 51-73. https://doi.org/10.1177/00472875231212996
40. Kim, Y. Y. (2001). Becoming intercultural: An integrative theory of communication and cross-cultural adaptation. London: Sage Publications.
41. King, W. R., & He, J. (2006). A meta-analysis of the Technology Acceptance Model. Information & Management, 43(6), 740–755. https://doi.org/10.1016/j.im.2006.05.003
42. Lin, T.-C., & Huang, C.-C. (2008). Understanding knowledge management system usage antecedents: An integration of social cognitive theory and task technology fit. Information & Management, 45(6), 410–417. https://doi.org/10.1016/j.im.2008.06.004
43. Ltifi, M. (2023). Trust in the Chatbot: A semi-human relationship. Future Business Journal, 9(1). https://doi.org/10.1186/s43093-023-00288-z
44. Lu, L., Cai, R., & Gursoy, D. (2019). Developing and validating a service robot integration willingness scale. International Journal of Hospitality Management, 80, 36–51. https://doi.org/10.1016/j.ijhm.2019.01.005
45. Mail, M. (2024, September 16). Lost in AI translation: ChatGPT error sparked confusion over my halal certification remarks, says Teresa Kok. Malay Mail; Malay Mail. https://www.malaymail.com/news/malaysia/2024/09/16/lost-in-ai-translation- chatgpt-error-sparked-confusion-over-my-halal-certification-remarks-says- teresa-kok/150615
46. Mat, M., & Shamsuddin, J. (2024). Integrating AI chatbots into halal practices: Principles, parameters, and guidelines. Journal of Law & Governance, 7(1), 132-146.
47. McKnight, D. H., Choudhury, V., & Kacmar, C. (2002). Developing and validating trust measures for e-commerce: An integrative typology. Information Systems Research, 13(3), 334–359. https://doi.org/10.1287/isre.13.3.334.81
48. Meuter, M. L., Ostrom, A. L., Bitner, M. J., & Roundtree, R. (2003). The influence of technology anxiety on consumer use and experiences with self-service technologies. Journal of Business Research, 56(11), 899–906.
49. Milwood, P. A., Hartman-Caverly, S., & Roehl, W. S. (2023). A scoping study of ethics in Artificial Intelligence Research in tourism and hospitality. Springer Proceedings in Business and Economics, 243–254. https://doi.org/10.1007/978-3-031- 25752-0_26
50. Moussawi, S., & Koufaris, M. (2019). Perceived intelligence and perceived anthropomorphism of personal intelligent agents: Scale Development and validation. Proceedings of the Annual Hawaii International Conference on System Sciences. https://doi.org/10.24251/hicss.2019.015
51. Nazri, N. A., Anuar, F. I., & Ridho, M. Z. (2024). The rise of bots: Exploring Malaysians' intention to use chatbots for travel planning. Journal of Tourism, Hospitality and Culinary Arts, 16(1), 454-470.
52. Nunnally, J. C. (1978). Psychometric Theory (2nd ed.). New York: McGraw-Hill.
53. Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory (3rd ed.). New York: McGraw-Hill.
54. Orden-Mejía, M., Carvache-Franco, M., Huertas, A., Orly Carvache-Franco, & Carvache- Franco, W. (2025). Analysing how AI-powered chatbots influence destination decisions. PLoS ONE, 20(3),

e0319463–e0319463. https://doi.org/10.1371/journal.pone.0319463
55. Pfaffinger, K. F., Reif, J. A., Spieß, E., & Berger, R. (2020). Anxiety in a digitalised work environment. Gruppe. Interaktion. Organisation. Zeitschrift Für Angewandte Organisationspsychologie (GIO), 51(1), 25–35. https://doi.org/10.1007/s11612-020-00502-4
56. Pillai, R., & Sivathanu, B. (2020). Adoption of AI-based Chatbots for hospitality and tourism. International Journal of Contemporary Hospitality Management, 32(10), 3199–3226. https://doi.org/10.1108/ijchm-04-2020-0259
57. Rafiq, F., Dogra, N., Adil, M., & Wu, J.-Z. (2022). Examining consumers' intention to adopt AI-Chatbots in tourism using the partial least squares structural equation modeling method. Mathematics, 10(13), 2190. https://doi.org/10.3390/math10132190
58. Romero-Charneco, M., Casado-Molina, A.-M., Alarcón-Urbistondo, P., & Cabrera Sánchez, J. P. (2025). Customer intentions toward the adoption of WhatsApp Chatbots for restaurant recommendations. Journal of Hospitality and Tourism Technology, 16(4), 784–816. https://doi.org/10.1108/jhtt-01-2024-0024
59. Said, M. F., Adham, K. A., Muhamad, N. S., & Sulaiman, S. (2020). Exploring halal tourism in Muslim-minority countries: Muslim travellers' needs and concerns. Journal of Islamic Marketing, 13(4), 824–842. https://doi.org/10.1108/jima-07- 2020-0202
60. Schei, O. M., Møgelvang, A., & Ludvigsen, K. (2024). Perceptions and use of AI chatbots among students in Higher Education: A scoping review of empirical studies. Education Sciences, 14(8), 922. https://doi.org/10.3390/educsci14080922
61. Schooler, C., & Hofstede, G. (1983). Culture's consequences: International differences in work-related values.Contemporary Sociology, 12(2), 167. https://doi.org/10.2307/2066725
62. Shen, M., Gu, A., Kang, J., Tang, X., Lin, X., Zhu, L., & Dusit Niyato. (2023). Blockchains for artificial intelligence of things: A comprehensive survey. IEEE Internet of Things Journal, 10(16), 14483–14506. https://doi.org/10.1109/jiot.2023.3268705
63. Siyal, A. W., Donghong, D., Umrani, W. A., Siyal, S., & Bhand, S. (2019). Predicting mobile banking acceptance and loyalty in Chinese Bank customers. Sage Open, 9(2). https://doi.org/10.1177/2158244019844084
64. Smrke, U., Špes, T., Mlakar, I., Musil, B., & Plohl, N. (2025). Technophobia mediates the associations between age, education level, and readiness to adopt new (health) technology among aging adults. Journal of Applied Gerontology, 44(3), 497–507. https://doi.org/10.1177/07334648241274260
65. Soonsan, N., & Jumani, Z. A. (2024). Perceptions of halal-friendly attributes: A quantitative study of tourists' intention to travel to non-Islamic destinations. Journal of Islamic Marketing, 15(6), 1441–1460. https://doi.org/10.1108/jima-07-2022-0204
66. Suharko, S., Khoiriati, S. D., Krisnajaya, I. M., & Dinarto, D. (2018). Institutional conformance of Halal certification organisation in Halal tourism industry: The cases of Indonesia and Thailand. Tourism: An International Interdisciplinary Journal, 66(3), 334–348.
67. Sumardi, W. H., Osman, S., & Sumardi, W. A. (2025). Halal tourism and the Global Muslim Travel Index (GMTI): A comparative study of Malaysia and Brunei Darussalam. The Halal Industry in Asia, 157–178. https://doi.org/10.1007/978- 981-96-0393-0_9
68. Sumarjan, N., Mazlan, N., Saiful Azmi, N. S., Kamaruddin, M. A., & Salleh, A. (2023). The usage intention of chatbot technology in hospitality and tourism industry: Customers' perspective. Journal of Tourism, Hospitality and Culinary Arts, 15(1), 206-224.
69. Turner, M., Kitchenham, B., Brereton, P., Charters, S., & Budgen, D. (2010). Does the technology acceptance model predict actual use? A systematic literature review. Information and Software Technology, 52(5), 463–479. https://doi.org/10.1016/j.infsof.2009.11.005
70. Tussyadiah, I. P., & Park, S. (2017). Consumer evaluation of hotel service robots. Information and Communication Technologies in Tourism 2018, 308–320. https://doi.org/10.1007/978-3-319-72923-7_24
71. Venkatesh, Morris, Davis, & Davis. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425. https://doi.org/10.2307/30036540
72. Wan Sulong, W. M., Mohd Zin, Z., Husain, S., Othman, M. S., & Ismail, M. Z. (2021). Satisfaction of Malaysian Muslim tourists with halal facilities in Japan. International Journal of Academic Research in Business and Social Sciences, 11(11). https://doi.org/10.6007/ijarbss/v11-i11/11687
73. Wanner, J., Herm, L.-V., Heinrich, K., & Janiesch, C. (2022). The effect of transparency and trust on Intelligent System Acceptance: Evidence from a user-based study. Electronic Markets, 32(4), 2079–

2102. https://doi.org/10.1007/s12525-022-00593-5

74. Xu, F., Huang, S. (Sam), & Li, S. (2019). Time, money, or convenience: What determines Chinese consumers' continuance usage intention and behavior of using tourism mobile apps? International Journal of Culture, Tourism and Hospitality Research, 13(3), 288–302. https://doi.org/10.1108/ijcthr-04-2018-0052
75. Yasmine, R. (2025, July 3). Elderly duo travel across Malaysia for a cable car ride seen in the clip only to find out it was all AI. The Straits Times. https://www.straitstimes.com/asia/se-asia/elderly-duo-travels-across-malaysia-for-cable-car-ride-seen-in-clip-only-to-find-out-it-was-all-ai
76. Yong, M. H., & Lee, Y. (2025). Smartphone self-paced learning with a chatbot in malaysian older adults. IEEE Technology and Society Magazine, 44(1), 24–32. https://doi.org/10.1109/mts.2025.3537157
77. Yu, S., & Chen, T. (2024). Understanding older adults' acceptance of Chatbots in healthcare delivery: An extended UTAUT model. Frontiers in Public Health, 12. https://doi.org/10.3389/fpubh.2024.1435329
78. Zhao, X., Sun, Y., Liu, W., & Wong, C. W. (2025). Tailoring generative AI chatbots for multiethnic communities in disaster preparedness communication: extending the CASA paradigm. Journal of Computer-Mediated Communication, 30(1). https://doi.org/10.1093/jcmc/zmae022
79. Zulhilmi, Z., Terpiadi, S., & Hafizh, M. (2024). Exploring the role of halal certification for the tourism industry in Aceh. El-Amwal, 7(1), 33. https://doi.org/10.29103/el- amwal.v7i1.1 5912.