A Promising Market: An Exploratory Study of the Factors Influencing Pilgrims' Adoption of Cooling Ihram

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Abstract

Major health issues arise during Al-Hajj season due to the high temperatures during summer, which can cause sunstroke or even death for pilgrims. Saudi Arabia has formulated several solutions for this issue based on the recommendations of Saudi Vision 2030, which aims to provide a safer and more comfortable Hajj experience for all pilgrims. Although many ideas were suggested, researchers have called for studies that explore the acceptance of an innovative cooling ihram among pilgrims during Al-Hajj. Therefore, this study aimed to explore pilgrims' acceptance of the cooling ihram designed to enhance their comfort during Al-Hajj. A review of previous studies revealed that comfort, cost, safety, ease of use, and reusability are the factors most affecting consumers' use of these innovative products. This study thus explored these factors, proposing actionable solutions to improve pilgrims' safety and overall experience during future Hajj seasons. A qualitative approach was employed, which involved data collection through face-to-face interviews with pilgrims during Al-Hajj (25 May 2025 to 1 June 2025). The main results of this research provide useful information about a promising market for companies who provide products for pilgrims in Islamic areas, as well as a better understanding of the factors underlying pilgrims' preferences during Al-Hajj.

***Keywords**: Cooling Ihram, Customer Experience, Al-Hajj Season, Saudi Arabia's Vision 2030, Innovation, Promising Market, Comfort, Cost, Safety, Ease of Use, Reusability.*

Introduction

Major health issues arise among pilgrims during Al-Hajj due to the high temperatures. However, Saudi Arabia has formulated several creative solutions for this issue based on Saudi Vision 2030 (Bugami, 2022; Saudi Vision 2030, 2023; Showail, 2022), which aims to provide a safer and more comfortable Hajj experience for pilgrims. With the annual increase in pilgrim numbers and rising temperatures, the healthcare system faces significant challenges in providing adequate medical services (Meo and Meo, 2024). The rise in temperatures and heat exposure harm pilgrims, increasing their risk of death from heatstroke (Wang et al., 2025). Notably, 62% of heat-related cases occur during peak daylight rituals (i.e., Dhuhr-Asr prayers) (Alkassas et al., 2021). According to the Saudi Ministry of Hajj and Umrah (2024), Al-Hajj is one of the most significant religious rites in Islam, drawing millions of Muslims from around the world to perform Al-Hajj in designated areas across Makkah. Pilgrim numbers often reach three million within the first two weeks of the season (Bugami, 2022).

The influx of pilgrims presents numerous logistical and health challenges. For example, long exposure to the record-breaking temperatures (exceeding 50 °C in some areas) in summer can lead to a sharp increase in

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body temperature, disrupting thermoregulatory functions and potentially causing heatstroke, heat exhaustion, or even death (Almuzaini et al., 2024; Wang et al., 2025). Saudi authorities reported 2,764 heat-related cases during Al-Hajj in 2024 (Saudi Ministry of Health [MoH], 2024), emphasising the urgent need for solutions like cooling ihram. However, there are barriers to the adoption of cooling ihram that extend beyond their technical design; pilgrims' acceptance relies on religious compliance (e.g., unstitched fabric), perceived benefits (e.g., a 4 °C temperature reduction), and cost (Almuzaini et al., 2024; Meo and Meo, 2024; Taibah et al., 2020; Yezli, 2023). This study aims to review relevant concepts associated with pilgrims' adoption readiness and related theories, and it discusses the importance of exploring factors influencing pilgrims in the literature involving pilgrims from around the Islamic world.

Theoretical Framework and Review of Previous Studies

Factors that influence the acceptance of cooling ihram – Health risks

Saudi Arabia has undertaken significant efforts to improve pilgrims' safety and comfort through multi-sectoral enhancements in health care, guidance services, and logistics (Saudi Gazette, 2024; Yezli, 2021). These government-led initiatives have established Al-Hajj and Umrah services as global benchmarks in mass gathering management (Taibah et al., 2020). Despite the government issuing warnings about not going out during the heat of the day, which is between 12 and 4 pm (Al-Bouwarthan et al., 2019), via the Tawakkalna app or the news, many pilgrims do not notice these warnings. They go out to walk during summer and then suffer from the high temperatures. According to the Saudi MoH (2024), during Al-Hajj in 2024, there were 2,764 heat-related cases, and exposure to hot environments may result in several heat-related illnesses that could result in death (Istiqomah and Azizah, 2020; Yezli, 2023).

These statistics underscore the critical need for wearable cooling solutions, particularly during peak ritual hours (e.g., Dhuhr-Asr prayers), when **62% of heat-related cases occur** (Alkassas et al., 2021; Shah, 2024). The HBM suggests that the perceived severity (e.g., risk of death) and benefits (e.g., 4 °C cooling) of ihram drive their adoption (Champion and Skinner, 2008). This emphasises the urgent need for solutions like cooling garments for pilgrims to wear during Al-Hajj or Umrah. This led to an exploration of how this factor could affect pilgrims' acceptance of cooling ihram during Al-Hajj or Umrah.

Religious Compliance

Religious considerations play a crucial role in pilgrims' acceptance of innovative cooling ihram. The sacred nature of ihram means that there are strict requirements to be considered. According to Al-Hassani (2020), maintaining the traditional, unstitched, white cotton design is non-negotiable for male pilgrims, as it represents a fundamental aspect of ritual purity. Moreover, empirical evidence from the study of Alkassas et al. (2021) presented at the Hajj innovation conference demonstrated that 78% of surveyed pilgrims would reject any cooling solution that visibly alters the appearance of ihram, emphasising the deep cultural and religious attachment to the traditional form of ihram (Meo et al., 2019). This shows that pilgrims prioritise religious authenticity over technical convenience, suggesting that successful innovations must first obtain religious endorsement (e.g., fatwa approval) before addressing functionality (Baalamash and Salim, 2020).

Religious compliance mediates all other adoption factors. This aligns with the modified TAM, which stipulates that perceived ritual compatibility is a stronger adoption factor than conventional variables like ease of use (Venkatesh et al., 2003). Hence, it is crucial to determine how this factor could affect pilgrims' acceptance of cooling ihram during Al-Hajj or Umrah.

Cost

Pricing significantly influences pilgrims' willingness to adopt innovative cooling ihram. Bugami (2022) found that pilgrims exhibit strong price sensitivity, with a clear preference for solutions costing under 500

SAR. Hence, cost and affordability are key determinants of mass adoption. Understanding cost barriers is essential for the following reasons: (1) Budget constraints make expensive innovations inaccessible since many pilgrims save for years to perform Al-Hajj; (2) if the perceived value of the cooling effect does not justify the price, adoption rates will decrease; (3) pilgrims may opt for cheaper (but less effective) options like umbrellas or frequent hydration if the garment is too costly.

Studies have suggested that rental models could enhance accessibility, as pilgrims often hesitate to invest in single-use purchases (Tu and Hu, 2018). Additionally, subsidised pricing through government or sponsorship programmes could encourage adoption, particularly among older and low-income pilgrims (Saudi Vision 2030, 2023). However, early adopters may pay premium prices, but late (and the majority of) users require cost-effective solutions (Tu and Hu, 2018). Moreover, pricing strategies (e.g., discounts for group purchases) could accelerate market penetration (Spann et al., 2015). Without addressing cost concerns, even the most advanced cooling ihram may face low adoption. Therefore, future research should explore optimal pricing tiers and subsidy frameworks to align with pilgrims' financial realities.

Cultural and Behavioural Factors

Cultural and behavioural factors play a critical role in pilgrims' acceptance of smart cooling ihram. Wang et al. (2025) found that older pilgrims often distrust 'smart' fabrics and so prefer traditional solutions due to their unfamiliarity with newer options. This shows the need for targeted awareness campaigns to educate users on ihram's safety and benefits (Rida Galaly and Dawood, 2024). Additionally, the UTAUT2, developed by Venkatesh et al. (2012) as an improvement to the original UTAUT, comprising new factors that influence technology adoption, especially in smart clothing, can be used to explain why people accept or reject modern technologies. It can also be used to explain adoption patterns, emphasising that social influence such as endorsements from religious scholars or community leaders can significantly accelerate acceptance.

Saudi authorities have implemented solutions such as multilingual mobile apps (e.g., Nusuk, Tawakkalna) that deliver real-time heat alerts (Saudi MoH, 2024) to mitigate hesitancy to adopt modern technologies. Moreover, training programmes for pilgrim guides (Sulaiman et al., 2008) demonstrate proper ihram use. However, cultural hesitancy affects pilgrims' acceptance of cooling ihram during Al-Hajj or Umrah. Therefore, this study examines how cultural factors could affect pilgrims' acceptance of cooling ihram during Al-Hajj or Umrah.

New Product Development for Cooling Ihram

The development of advanced cooling ihram has become a vital innovation to protect pilgrims from extreme hot weather during Al-Hajj. Recent technological innovations include phase-change material vests, which were designed for military use and absorb and dissipate body heat (Shahid et al., 2024). There are also graphene-enhanced fabrics, proven to lower skin temperature by 3-5 °C in field tests and biomimetic textiles, inspired by desert-adapted species, which enhance evaporative cooling (Zhang et al., 2024). Further, moisture-wicking fabrics with UV protection (Taibah et al., 2020) and portable cooling systems (Arab News, 2024) demonstrate significant potential. However, adoption depends on three key factors: religious compliance, as the ihram must ascribe to ihram's traditional form (unstitched, white cotton), user comfort (i.e., lightweight), and affordability (ideally ≤ 500 SAR).

Complementing technological innovations, Saudi Arabia's Fashion Commission has launched the Sustainable Ihram Initiative to recycle used pilgrimage ihram through textile reprocessing and pilgrim awareness programmes (Saudi Gazette, 2025). This aligns with this study's focus on factors that influence the acceptance of cooling ihram by addressing environmental concerns that influence 21% of pilgrims' sustainability choices (Fairuz, 2024; Muhammad and Al-Dabbagh, 2023). Understanding product de-

velopment trends can also aid in identifying feasible technologies and improving designs for pilgrims (e.g., that prioritise breathability). Finally, the innovations need to align with Saudi Vision 2030 for innovative Al-Hajj solutions. Consequently, investigating the impact of new product development processes on pilgrims' willingness to adopt cooling ihram technologies remains a research priority.

Theoretical Framework

This study examined the factors influencing pilgrims' willingness to adopt innovative cooling ihram by integrating three theoretical theories: the TAM, UTAUT2, and HBM. The TAM and UTAUT2 explain how perceived usefulness (PU), perceived ease of use (PEOU), social influence, and institutional support shape adoption intentions (Davis, 1989; Lee et al., 2025; Venkatesh et al., 2003). The HBM complements these models by incorporating health-related perceptions, such as heat stroke and the expected benefits of cooling solutions (Rosenstock, 1974).

The TAM and Cooling Ihram Adoption

The TAM offers a solid framework for examining pilgrims' adoption of cooling ihram through two key dimensions: PU and PEOU. In the context of this research, PU includes pilgrims' beliefs about safety, including heatstroke prevention, comfort during Al-Hajj, and reusability with long-term value, while PEOU involves evaluating the technology's ease of use and affordability. The TAM is valuable for assessing individual adoption decisions among pilgrims, where practical considerations like cost and comfort may outweigh technological benefits. This model aids in identifying how pilgrims consider these factors when evaluating the potential of cooling ihram to enhance their experience while maintaining their safety. However, while the TAM effectively addresses these functional attributes, a careful consideration of unique environmental and cultural variables that may influence pilgrims' perceptions is also needed (Davis, 1989; Venkatesh et al., 2003). The application of the TAM to the adoption of cooling ihram contributes to new product development research by demonstrating how traditional technology acceptance factors interact with pilgrimage-specific requirements.

The UTAUT2 and Cooling Ihram Adoption

The UTAUT2 (Venkatesh et al., 2012) can aid in examining cooling ihram adoption among pilgrims since it integrates most key constructs related to critical adoption factors. According to Abd El Fattah et al. (2020), performance expectancy relates to safety concerns, as pilgrims evaluate ihram's efficacy in preventing heat-related conditions. Moreover, effort expectancy includes ease of use, particularly with how seamlessly the technology integrates with religious activities. The hedonic motivation construct captures comfort aspects, where breathability and wearability during extended use become crucial adoption determinants. Price value addresses cost considerations, which are especially important given the diverse economic backgrounds of pilgrims (Saayman et al., 2014). Social influence factors, including endorsements from religious authorities, significantly impact adoption intentions in this faith-based context (Kim et al., 2024). Facilitating conditions involve infrastructure support, such as cooling stations near holy sites (Arab News, 2024), while habit formation relates to reusability, where pilgrims' prior experiences with similar technologies influence adoption rates (Tamilmani et al., 2019).

This comprehensive model can be used in the Al-Hajj context since it simultaneously includes functional attributes (e.g., safety and ease of use), economic factors (e.g., cost), and experiential qualities (e.g., comfort) while accounting for the unique socio-cultural environment of pilgrimages. Empirical studies in similar contexts have demonstrated the UTAUT2's use in explaining up to 74% of the variance in technology adoption behaviours (Tamilmani et al., 2019), making it particularly suitable for investigating innovative solutions for Al-Hajj season.

The HBM and Cooling Ihram Adoption

The HBM complements the other two theories since it aids in examining how health risk perceptions drive cooling ihram adoption. The HBM posits that pilgrims are more likely to use ihram if they perceive that they are susceptible to heatstroke, believe in its severity, and see benefits in the use of the ihram (Champion and Skinner, 2008). For instance, older pilgrims may adopt the technology if they view themselves as vulnerable to heat stroke and trust that the ihram will be effective and beneficial. The HBM is especially relevant for the context of Al-Hajj, where extreme temperatures pose life risks. By integrating the HBM with the TAM and UTAUT2, this study provides an understanding of how health concerns intersect with technological and cultural factors to shape adoption behaviour. Specifically, this study offers a comprehensive framework that addresses health motivations (via the HBM), technology perceptions (via the TAM), and socio-cultural factors (via the UTAUT2). This theoretical approach ensures a holistic assessment of pilgrims' decision-making processes, as can be seen in Table 1.

Table 1: Theoretical Frameworks and their Relationships to Cooling Ihram Adoption Factors

Theory	Key Adoption Factor	Supporting Reference (Elsevier/ High-impact Journals)
TAM	**Ease of Use**: Pilgrims prioritise ihram that do not interfere with religious activities (i.e., PEOU). **Safety**: PU increases if the ihram is believed to prevent heatstroke. **Reusability**: Long-term utility enhances PU.	Davis (1989) Venkatesh & Davis (2000) Chae (2010) Park & Lee (2012) Hwang et al. (2016)
UTAUT2	**Comfort:** Adoption becomes more likely if the garment feels comfortable and light or cooling. **Cost**: Price value determines affordability (e.g., > 500 SAR reduces adoption). **Ease of Use**: Effort expectancy is critical for older pilgrims. **Safety**: Performance expectancy (cooling efficacy) is a primary driver of adoption.	Venkatesh et al. (2012) Duan et al. (2019) Jin (2020) Dwivedi et al. (2021) Shoheib & Abu-Shanab (2022) Qin & Li (2024)
HBM	**Safety**: Perceived susceptibility to or severity of heatstroke increases adoption. **Cost**: High prices may outweigh perceived benefits. **Comfort**: Cues to action (e.g., peer illness) strengthen risk perception.	Rosenstock (1974) Champion & Skinner (2008) Carpenter (2010)

Recent studies have investigated the effectiveness of cooling vests made from phase-change material for heat stress mitigation. These vests have shown promise in reducing heart rate and skin temperature compared to no-vest conditions in industrial settings (Ciuha et al., 2023). However, current cooling solutions remain inadequate for ihram's unique requirements for religious compliance (i.e., unstitched, pure cotton) and mass scalability.

The Objectives of Studying Cooling Ihram Acceptance

Given the extreme crowding and harsh environmental conditions during Al-Hajj, there is a critical need for innovative solutions, such as cooling ihram that become cooler when wet, an example of which is shown in Figure 1.

The towel pictured in Figure 1 is designed to provide instant relief from heat, making it ideal for various sport, work, or festival activities, or to simply stay cool on hot days. Mission towels use hydro active technology that activates when the towel is wet, cooling the towel to 30 °C, which is below body temperature, providing immediate relief from the heat. Depending on the model, the cooling effect can last up to three hours. These towels also provide UPF 50 sun protection.

Figure 1: Innovative Cooling Towel from the Mission Company

This towel prompted the idea of using the same fabric for both male and female ihram to mitigate heat-related health risks, particu-

larly for pilgrims with pre-existing conditions. Male pilgrims wear traditional ihram – a two-layered white garment without thermal regulation properties (Abd El Fattah et al., 2020; Ayoub Meo et al., 2020), while female pilgrims are not restricted to specific ihram and may wear any clothing of their choice, if it is not immodest (tabarruj) (Al-Hassani, 2020; Baalamash and Salim, 2020). This study aims to explore pilgrims' acceptance of cooling ihram and the factors that may affect their acceptance of this ihram. The aim is to reduce cases of heatstroke, thereby enhancing health safety and aligning with Saudi Vision 2030 objectives aimed at improving pilgrims' experiences (Bugami, 2022). While technical efficacy is crucial, for pilgrims to adopt cooling ihram, factors including cultural acceptance, cost, and ease of use must be considered (Venkatesh et al., 2003). Through interviews with pilgrims, this study analyses religious compliance and cost. Using the qualitative approach of face-to-face interviews, this study assesses pilgrims' willingness to adopt this innovative ihram. This study builds on key factors identified in prior research: (1) health protection needs (Wang et al., 2025), (2) religious compliance (Al-Hassani, 2020), (3) cost sensitivity (Bugami, 2022), and (4) cultural trust factors (Venkatesh et al., 2012). These factors are systematically analysed using the second version of the unified theory of acceptance and use of technology (UTAUT2), technology acceptance model (TAM), and health belief model (HBM), as described in the literature review. The current work extends this foundation by establishing an empirical understanding of how these factors interact in pilgrims' decision-making. The findings can inform both product development and policy makers about Al-Hajj innovation adoption. Despite there being existing cooling technologies, there is a large gap in the literature on the factors that influence the acceptance of such cooling technologies. This gap persists despite the Vision 2030 mandate for innovative ideas to enhance the overall Al-Hajj experience (Saudi Vision 2030, 2022).

Conceptual Framework

In the literature on perceived severity and perceived benefits, pilgrims' belief in the risk of heatstroke increases the adoption of cooling fabrics (Almuzaini et al., 2024; Meo and Meo 2024; Taibah et al., 2020; Yezli, 2023). It has also been suggested that adoption will increase if the product meets all requirements for ihram, including that it is unstitched, breathable, and usable (Baalamash and Salim, 2020; Meo et al., 2019). Additionally, research has suggested that affordable or low prices can increase adoption (Chenaker and Bouhafs, 2024; Wasiuzzaman, 2018), as well as the option to try the item before purchasing it (Tu and Hu, 2018). Figure 4 provides an illustration of the relationship between the factors influencing pilgrims' adoption of cooling ihram in this study.

The Design of the Study

Certain research problems call for certain approaches. For example, if the research problem requires examining or testing for the factors that influence a behaviour, it would be better to use a quantitative approach, but if a phenomenon needs to be explored because no research is available on it, a qualitative approach would be better (Creswell et al., 2003; Creswell et al., 2007). The research problem of this study involved

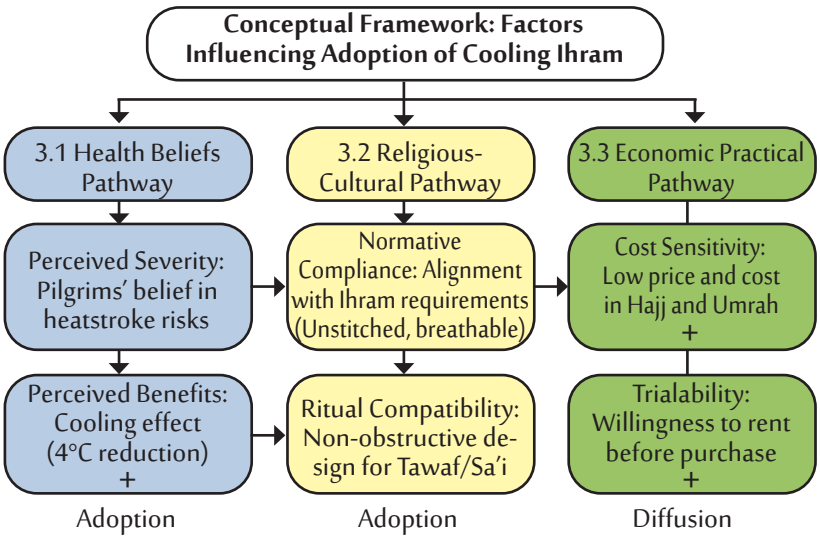

Figure 2: A Conceptual Framework for the Relationships between the Factors Influencing Pilgrims' Adoption of Cooling Ihram

understanding the importance of using cooling ihram to reduce the high number of pilgrims who suffer from the heat during summer Al-Hajj. The literature review revealed that no studies have been conducted on this problem and the factors related to the acceptance of using cooling ihram. Since there are millions of pilgrims who participate in Al-Hajj and come from various backgrounds, quantitative measures would not be ideal for examining the research topic (Creswell & Poth, 2016). Qualitative methods are more suited to capturing individual behaviours and complex social or cultural differences (Denzin & Lincoln, 2011).

Research Approach

This research adopted an exploratory qualitative approach, collecting data from pilgrims from various Islamic countries. This structure was chosen since such variations could lead to uncovering deep insights into religious, cultural, and health-related factors that might explain differences in acceptance behaviours. This study used semi-structured interviews, which took place in the hotels at which the pilgrims were staying in the city of Makkah during Al-Hajj season (25 May 2025 to 1 June 2025). Each interviewee received detailed information about and a picture of the cooling towel (Figure 1) before the interview, and they could ask questions about innovative cooling ihram and share their ideas about it. The sample comprised 15 male and female pilgrims who had come to Saudi Arabia for Al-Hajj from Asia, Saudi Arabia, Egypt, and Libya. The face-to-face interviews were conducted in both Arabic and English. This sampling approach was chosen to ensure the representation of the preferences of pilgrims from various regions relevant to the interview questions. Each interview lasted about 15 to 30 minutes. Interviewees' ages ranged from 19 to 65 years. Each interview was recorded and transcribed, then the data were analysed using thematic analysis (Braun & Clarke, 2006) following a systematic coding process to identify themes and insights.

Findings and Discussion of the Study

The qualitative results revealed several core themes related to the acceptance of innovative products like cooling ihram, including comfort, cost, safety, ease of use, and reusability.

Safety and Health Risks

The qualitative responses revealed that all interviewees were uncomfortable with the idea of being exposed to the high temperatures and potential heat waves common during Al-Hajj. Despite the government's warnings sent via the Tawakkalna app or the news (Al-Bouwarthan et al., 2019), many people still go out for a walk during the heat of the day (12 to 4 pm). Interviewees of different nationalities demonstrated various viewpoints of the heat. For instance, an interviewee from Asia said that they do not mind the high temperatures as long as they have a water sprayer with them:

> *I am okay with the heat. We came from Indonesia. We have a similar weather, so I am okay with using this water spray, but if what you say about the cooling ihram is right, why not? It will be great. (Pilgrim interviewee 1)*

However, an interviewee from Saudi Arabia said, 'I had to sit so many times on the floor because of the dizziness from the sun, and once, people put some water on my head to make me better' (Pilgrim interviewee 13).

Almost every interviewee agreed to buy the cooling ihram to decrease their discomfort from the heat, in accordance with the HBM (Champion & Skinner, 2008), which allows for examining health risk perception as an adoption driver and explains adoption through several concepts such as fear of death or heatstroke. Moreover, the UTAUT2 explains that people adopt technology based on several factors, including performance expectancy, which could explain why pilgrims will adopt a cooling garment if they believe it really prevents heatstroke: 'It is new product with a modern technology. If it is really working, of course I will

buy it' (Pilgrim interviewee 4). These findings suggest that perceived safety, both physical and psychological, plays a critical role in adoption behaviour and may warrant integration into the UTAUT2.

Perceived Benefits

Cooling efficacy has been demonstrated in lab trials (Zhang et al., 2024; ACS Nano). However, from the interviews, it was evident that pilgrims with limited information about cooling ihram and its benefits may not buy them. As Pilgrim interviewee 8 said, 'I can use it on many occasions, like during my outdoor activities, running, or hike. Will be very useful.' Pilgrim interviewee 4 said, 'I saw it in Disneyland. Everyone was wearing it. That is why I bought one, as well. It was really worth it and cooling, especially for Mohammad, my six-year-old son.'

The collected data also suggested that it is important to understand how cooling ihram work, and interviewees suggested that if they can try it or see reviews about it, they would be happy to buy it. Both the UTAUT2 and TAM emphasise PU and PEOU as critical factors influencing the adoption of new products (Davis, 1989; Venkatesh et al., 2003; Venkatesh et al., 2012). These models suggest that users are more likely to accept and engage with a product when they believe it will enhance their performance or experience or when it is easy to use. This theoretical framework provides valuable insights into interviewees' responses in the current study, particularly in relation to their preferences for cooling ihram.

Cost Sensitivity and Reusability

Every interviewee revealed that, 'It is eventually about the cost: I will buy it if it is not expensive or similar in price to other products' (Pilgrim interviewee 4). However, a participant from Egypt had a different point of view about price and reusability, as she believed that a high price is worth paying, even up to 2,000 SAR, as she wants to reuse the item many times, she can give it to a relative, and it is easier to use than holding an umbrella:

> *Price, as I will use it more than one, and I can lend it to my relatives, so I do not mind paying up to 2000 riyal, especially because I can wear it and I do not need to hold it like an umbrella. (Pilgrim interviewee 6)*

This result was different from that of most previous literature. However, most interviewees agreed on a price between 300 to 500 SAR since they can use the item more than once. This suggests a new market for cooling ihram.

Price has been defined as the cost of an item or service in traditional economics; however, recent studies have suggested that price is a way to inform people about the value of an item or service (Sharaf & Perumal, 2018). One interviewee said, 'If I can buy the cooling ihram with offers will be very nice, as I can buy abaya scarf and cap for less price' (Pilgrim interviewee 6). The findings of this study align with the UTAUT2 model, which extends the original TAM by incorporating additional factors such as price (Venkatesh et al., 2012). Interviewees consistently mentioned the importance of affordability when considering the adoption of new products. This supports the relevance of price as a key factor in influencing pilgrims' behaviours, particularly when economically diverse backgrounds are involved, such as during Al-Hajj season, where financial considerations may significantly affect consumer choices. These results suggest that beyond usability and functionality, economic factors remain central to the acceptance of cooling ihram, reinforcing the value of the UTAUT2 framework in capturing these dimensions.

Comfort

In terms of clothing, comfort is fundamental (Kamalha et al., 2013). An interviewee frequently described their preference for cooling ihram that feel comfortable:

> *If the ihram is lightweight, absorbs sweat quickly, and comfortable while, and as you said, it can provide a cooling effect, it would be an extremely suitable product. It would spare us the need to carry an umbrella, which sometimes flies away when it is windy – mine broke once. Honestly, I would much rather wear something that keeps me cool. (Pilgrim interviewee 2)*

This statement shows how the comfort of cooling ihram can significantly influence product preferences, especially in physically demanding conditions such as Al-Hajj season. As noted in the quote, the discomfort of carrying umbrellas, especially under windy and very hot conditions, makes a wearable cooling solution more desirable for pilgrims. This insight aligns with the PEOU factor of the TAM (Davis, 1989), which suggests that products that reduce physical exertion are more likely to be accepted among pilgrims. Moreover, the effort-saving and cooling features mentioned can also be linked to the effort expectancy and performance expectancy factors of the UTAUT2 (Venkatesh et al., 2012), which stipulates that when a product reduces both physical discomfort and operational burden, its PU and chances of adoption are greatly increased. This emphasises the importance of designing climactically responsive products for religious and regional contexts.

Ease of Use

In terms of ease of use, Pilgrim interviewee 10 said:

> *I really appreciate the idea of it because it was not easy for me to walk and hold the umbrella, spray, as well as my other stuff. Also, I am a lady not too tall. I was hitting others with my umbrella. It was so embarrassing.*

Another interviewee said, 'If the cooling ihram was available online in my country, or around the hotels in the city centre in Makkah, I will buy it, but if I had to look for it, I would not try' (Pilgrim interviewee 15). Additionally, Pilgrim interviewee 7 said that 'It must be comfortable and easy to wash,' while Pilgrim interviewee 2 said that 'It will be great if they sell it in the airport or the train station. It will be easier for us to buy it.'

Most collected data revealed that pilgrims need to decrease the number of items they are holding. Hence, if there is a hat or full ihram that could decrease their temperature, it would be amazing, especially if they could use it in several places. Another factor in the UTAUT2 was found in this study: Based on technology-related factors such as effort expectancy, pilgrims will adopt an item if they understand it, it is lightweight, and it does not interfere with their religious activities.

There is a gap in the use of innovative cooling ihram to increase pilgrim satisfaction during Al-Hajj season. This qualitative study explored participants' perceptions of adopting a climactically responsive product such as a cooling towel, which uses hydro active technology that activates when the towel is wet. This towel can decrease one's body temperature to 30 °C, which is below body temperature, providing immediate relief from the heat. Depending on the model, the cooling effect can last up to three hours. These towels also provide UPF 50 sun protection. Cooling ihram that uses water to reduce body temperature for three hours, with a particular focus on safety, comfort, ease of use, and affordability, would be ideal, based on the UTAUT2, TAM, and HBM. While core factors such as PU, PEOU, and price were confirmed to be relevant, interviewees consistently revealed that comfort and safety had the strongest influence on their decision-making about adopting new cooling ihram.

The Limitations of the Study

This study had several limitations. First, it is not easy to monitor consumers' actual behaviours, especially since Al-Hajj season is short and individuals from many countries come to Saudi Arabia for Al-Hajj. It may be promising to conduct a quantitative study on this topic. This approach could provide rich infor-

mation about pilgrims in Al-Hajj season if a larger sample is included. Moreover, the data collected for this study cannot be fully generalized due to the limited sample size and participant diversity. It could be conducted with a larger and more diverse population in future research to better strengthen the generalizability of the findings. Additionally, the timing of the study during Al- Hajj season presented logistical challenges, as many pilgrims were focused on performing their Hajj, making it difficult to access and engage with them.

The Recommendations of the Study

Future research should explore the role of product experiences in user perceptions and acceptance. Several interviewees discussed the importance of seeing, trying, or touching the product in person before making a purchase decision. This suggests that personal interaction, testing, and visual inspection may significantly enhance users' trust, comfort, and perceived product value, especially for products intended for use in physically demanding or culturally sensitive environments. Future studies could thus investigate how pre-use exposure, such as product samples, or virtual trials, impact pilgrims' behaviours. Manufacturers should consider working with health authorities and organizations to explore the official adoption of the cooling ihram, particularly for elderly pilgrims or those with chronic illnesses. Moreover, comparative studies that include a group wearing the traditional ihram would also be beneficial to determine the added value of the cooling technology. Finally, future research should address language barriers by involving multilingual researchers to include non-Arabic and non-English-speaking participants.

However, this study makes several contributions to the literature. Its main theoretical contribution is that it challenges and expands the boundaries of the TAM and UTAUT2 by emphasising comfort and safety as essential factors in technology and product acceptance, especially in hot climates and conservative cultural contexts. Its main practical contribution is that its findings offer valuable insights for product designers and marketers into the importance of formulating solutions that are not only functional and affordable but also physically comfortable. The findings also predict a promising new market for innovative products aimed at the millions of pilgrims who attend Al-Hajj and Umrah each year.

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