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The importance of UI & UX Design in Virtual Reality for Showcasing Umrah Rituals: Impact of Age and Cybersickness in User Experience

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Abstract

As part of the Saudi strategy 2030 vision for digital transformation that extends to religious tourism, the current study investigates **the potential of Virtual Reality (VR) applications in fostering engagement in religious tourism, specifically in a population with a diverse age range**. Employing a theoretical framework based on the Technology Acceptance Model, the study incorporates elements related to user intent, examining variables like ease of use, user usefulness, age, past use and cybersickness. The research employed quantitative methods using questionnaires for 200 participants, resulting in a finalized model of 26 items. Our findings reveal significant positive impacts of past use on ease of use and of 3D VR 360 environments on both ease of use and enjoyment. Notably, the study unveils a positive correlation between age and technology anxiety, as well as age and cybersickness, while highlighting a negative influence of cybersickness on attitudes towards using VR systems. Furthermore, past use of VR applications significantly influenced ease of use. These findings are critical for the refinement of VR systems designed for religious tourism and present implications for age-inclusive design and user well-being, thus serving as a cornerstone for both academic inquiry and practical application in the burgeoning intersection of VR and tourism.

Keywords:

Virtual Reality, User Experience, Cybersickness, Age, Past Use, Technology Acceptance Model, Religious Tourism, User Interface (UI) design refers to the aesthetic elements by which people

interact with a product, such as buttons, icons, menu bars, typography, colours, and more, User experience (UX) design refers to the experience a user has when interacting with a product.

THE STUDY RESEARCH PROBLEM

The problem that this study investigates is the potential of Virtual Reality (VR) applications in fostering engagement in religious tourism, specifically in a population with a diverse age range. Since the emergence of immersive technologies and their hardware such as headsets and smart glasses in the last few years, various studies and projects started to build applications to harness these gadgets without an in-depth consideration to usability and User Experience (UX) of these new mediums. Very few articles including systematic and technical reviews investigated this subject and according to a recent study, there is a significant lack on achieving the UX in immersive applications due to some factors related to the design process, user research and testing.

1 BACKGROUND:

The Theoretical Side:

Umrah, also known as the lesser pilgrimage, holds significant religious importance in Islam (Almuhrzi and Alsawafi, 2017). It involves specific rituals that are performed in the religious cities of Makkah and Madinah in Saudi Arabia. Millions of Muslims from around the world aspire to travel and perform Umrah every year as it is considered a spiritually rewarding journey (Henderson, 2011). However, not everyone has the opportunity to physically travel to these holy sites due to various reasons, such as financial constraints, health limitations, or other logistical challenges (Brdesee, 2013).

Virtual Reality (VR) technology has arisen as a promising tool to provide immersive and interactive experiences, allowing individuals to virtually explore different places and cultures (Theodoropoulos and Antoniou, 2022). VR has the capability to evoke a feeling of being physically present in a different environment and enable users to feel like they are physically present in a different location, even when they are physically confined to a different place (Zhao et al., 2020). Using VR to showcase Umrah rituals could potentially bridge the gap for individuals who are unable to travel to the holy cities in person, allowing them to virtually experience the spiritual journey and participate in the rituals from the comfort of their own homes or local communities.

The adoption of VR in the context of showcasing Umrah rituals has the potential to motivate and inspire individuals to travel and perform Umrah in person. By providing a virtual experience that closely resembles the actual Umrah rituals, VR can create a sense of familiarity, excitement, and emotional connection, which can trigger a desire to embark on the physical pilgrimage (Cadet et al., 2022). Additionally, experiencing Umrah rituals through VR may serve as a preparatory tool for individuals who are planning to perform Umrah in the future, allowing them to familiarize themselves with the rituals, gain confidence, and reduce anxiety associated with the unknown. Moreover, VR can provide a unique and accessible way for individuals who are physically unable to travel, such as elderly or individuals with disabilities, to participate in the spiritual journey and connect with their faith (Areheart and Stein, 2014).

The literature on VR and travel motivation suggests that utilitarian and hedonic values play a crucial role in influencing individuals' travel decisions (Mainolfi et al., 2022). Utilitarian values refer to the practical benefits and usefulness of the travel experience, such as acquiring knowledge, achieving personal goals, or fulfilling religious obligations (Han et al., 2018). Hedonic values, on the other hand, encompass the emotional and sensory aspects of the travel experience, such as pleasure, excitement, and sensory stimulation (Tasci and Ko, 2016). In the context of using VR to showcase Umrah rituals, both utilitarian and hedonic values are relevant factors that may influence individuals' motivation to travel and perform Umrah in person.

Prior study has shown that VR experiences can significantly impact travel motivation (Perdana Kusumah et al., 2022). Another study conducted by Kim et al. (2022) revealed that VR experiences can evoke a sense of presence, stimulate curiosity, and trigger emotional connections, which can positively influence individuals' travel motivation. Another study González-Rodríguez et al. (2020) argued that VR experiences can enhance the utilitarian value of a destination by providing immersive and realistic representations, allowing individuals to gain knowledge, familiarity, and confidence, which can influence their travel decisions.

However, there is ait was found a research gap in the literature when it comes to investigating the use of VR to showcase Umrah rituals and its impact on travel motivation. Specifically, there is a lack of studies that examine the relationship between age and cybersickness in the context of showcasing Umrah rituals using VR, as well as the factors that influence travel motivation, including utilitarian and hedonic values. This research proposal aims to fill this gap by investigating of these research questions, which can add to the body of knowledge on VR, travel motivation, and the use of VR for showcasing Umrah rituals.

2 LITERATURE REVIEW:

2.1 Virtual Reality and Travel Motivation:

Virtual Reality (VR) has been shown to have a significant impact on travel motivation, as it can create immersive and realistic experiences that evoke a sense of presence and stimulate users' curiosity and emotional connections (Fan et al., 2022). VR allows users to feel as if they are physically present in a virtual environment, and this sense of presence can trigger the desire to travel to the real destination (Melo et al., 2022).

Utilitarian and hedonic values are two key factors that influence travel motivation in the context of VR experiences (Lee and Kim, 2021). Utilitarian value refers to the functional benefits obtained from the travel experience, such as acquiring knowledge, seeking information, and problem-solving (Vogt and Fesenmaier, 1998). Hedonic value, on the other hand, is associated with the emotional and experiential aspects of travel, such as enjoyment, novelty, and escapism (Ponsignon et al., 2021). In the context of using VR to showcase Umrah rituals, understanding how these utilitarian and hedonic values influence travel motivation is crucial. Utilitarian value can be enhanced through VR experiences that provide informative and educational content about the Umrah rituals, allowing users to learn and gain knowledge about the religious practice. VR can provide a platform for users to virtually explore the holy sites, understand the significance of each ritual, and learn about the historical and cultural aspects of Umrah. This can fulfill the utilitarian value of obtaining information and knowledge and may motivate users to travel and perform Umrah in person to experience the real pilgrimage.

Hedonic value can also be influenced by VR experiences of Umrah rituals. VR has the potential to create emotionally engaging and immersive experiences that trigger emotional connections, excitement, and novelty (Filter et al., 2020). Users may feel a sense of joy, awe, and spiritual upliftment as they virtually participate in the Umrah rituals, which can enhance the hedonic value of the experience. VR can also provide a form of escapism, allowing users to momentarily detach from their physical surroundings and immerse themselves in the virtual world of Umrah rituals. This can fulfill the hedonic value of enjoyment and novelty and may trigger a desire to seek similar experiences in the real pilgrimage. Moreover, VR experiences of

Umrah rituals can also evoke a sense of social connectedness, another important factor in travel motivation (Bogicevic et al., 2019). Users may feel connected to the global Muslim community as they virtually participate in the same rituals that millions of other Muslims perform in the holy cities of Makkah and Madinah. This sense of social connectedness and belonging can further enhance the hedonic value of the VR experience, as users may feel part of a larger community with shared beliefs and practices. It is important to note that the effectiveness of VR in influencing travel motivation may vary depending on individuals' characteristics, such as age and previous travel experience (An et al., 2021). For instance, younger generations who are more familiar with technology and have higher exposure to VR may perceive the virtual experience differently compared to older generations (Liu et al., 2020). Research has shown that older individuals may have different cognitive and sensory abilities, which may impact their perception of VR experiences (Appel et al., 2020). Thus, it is important to consider the age factor and investigate how different age groups perceive and respond to VR experiences of Umrah rituals. Another factor to consider is the potential for cybersickness, which refers to discomfort or nausea caused by the use of VR technology (Davis et al., 2014). Cybersickness can be more prevalent among certain individuals, such as those who are prone to motion sickness or have visual impairments (LaViola Jr, 2000). Previous research has shown that cybersickness can influence users' perception of presence and overall VR experience (Narciso et al., 2019, Servotte et al., 2020). Therefore, it is important to investigate the potential impact of cybersickness on users' perception of Umrah tourism.

2.2 Age and Cybersickness:

Another important factor to consider when using VR is age, as it can influence the users' experience and perception of cybersickness (Weech et al., 2020). Previous studies have suggested that older adults may be more susceptible to cybersickness compared to younger individuals due to age-related changes in sensory and motor functions (Weech et al., 2019). Investigating the relationship between age and cybersickness in the context of showcasing Umrah rituals using VR can provide valuable insights for designing effective VR experiences for different age groups.

Research has shown that older adults may have different cognitive and sensory abilities compared to younger generations, which can influence their perception and experience of VR (Gamberini et al., 2006). For example, age-related declines in visual acuity, depth perception, and balance may affect older adults' ability to perceive and process the visual and vestibular cues in VR environments, potentially leading to an increased risk of cybersickness (Munafo et al., 2017). Additionally, older adults may have different cognitive processing capacities, such as working memory and attention, which can impact their ability to navigate and interact with VR environments effectively (Wojciechowski et al., 2021). Therefore, it is important to consider the age-related factors that may influence the perception of VR experiences of Umrah rituals.

Furthermore, older adults may have different levels of familiarity and experience with technology, including VR. While younger generations have grown up with technology and may be more familiar with VR, older adults may have less exposure to such technologies, resulting in different perceptions and responses to VR experiences (Vaportzis et al., 2017). Research has shown that older adults may have lower levels of digital literacy and confidence in using technology, which can impact their ability to navigate and interact with VR environments (Alyahya and McLean, 2022). They may also have different expectations and preferences for VR experiences, which can influence their motivation to engage with and travel to the real destination after experiencing Umrah rituals in VR. Therefore, investigating how different age groups perceive and respond to VR experiences of Umrah rituals can provide insights into the potential effectiveness of this approach among diverse age segments.

In addition to age-related factors, cybersickness can also impact users' perception and experience of VR. Cybersickness is a common phenomenon that occurs when there is a conflict between the visual and vestibular cues in VR environments, resulting in discomfort and symptoms like motion sickness (Munafo et al., 2017). The severity and occurrence of cybersickness can vary among individuals and can be influenced by factors such as the duration of VR exposure, the intensity of VR stimuli, and individual susceptibility to motion sickness (Mazloumi Gavgani et al., 2018). Therefore, it is crucial to investigate the potential impact of cybersickness on users' perception of Umrah rituals in VR, as it can influence their motivation to travel to the real destination.

Mitigating cybersickness in VR experiences is important to ensure a positive user experience. One approach to reduce cybersickness is to optimize the design of VR experiences, such as minimizing abrupt movements, providing visual cues for orientation, and optimizing the frame rate and resolution of VR content (Weech et al., 2019). Another approach is to gradually acclimate users to VR environments through exposure therapy, where users gradually increase their exposure to VR experiences over time to build tolerance to cybersickness (Munafo et al., 2017). Additionally, providing breaks during VR experiences, allowing users to take regular breaks to rest and recover, and also it can encourage users to self-monitor and manage their symptoms. Based on the background and literature review, the following research questions are proposed:

- What is the relationship between age and cybersickness when using VR to showcase Umrah rituals?
- What are the factors that influence travel motivation, including utilitarian and hedonic values, when using VR to showcase Umrah rituals?

3 RESEARCH HYPOTHESIS:

This section articulates the social constructs, research hypothesis accompanied with the previous related studies, as depicted in Fig. 1.0.

3.1 Past Use (PU)

As per Davis's (1989) Technology Acceptance Model (TAM), one of the main factors affecting a technology's adoption is its perceived ease of use (EOU). In the context of VR, prior exposure to similar systems has been found to positively influence the user's perception of ease of use (Venkatesh et al., 2003). Users with previous experience tend to find the interface more intuitive and are generally quicker to learn the functionalities (Sun & Zhang, 2006). This suggests that familiarity can contribute to reducing the cognitive load, thereby making the system seem less complicated (Sweller, 1988). However, it is crucial to distinguish between the types of past experiences users have had. Positive past experiences will likely lead to higher perceived ease of use, whereas negative experiences may deter users from interacting with new systems (Bhattacherjee, 2001). Additionally, the complexity of the previous system in comparison to the new one can either enhance or degrade the ease-of-use perceptions (Karahanna et al., 1999). Recent studies have also shown that the domain of application can impact the relationship between past use and ease of use. For instance, medical professionals using VR for surgical training found that their previous experience with less advanced systems did not necessarily translate to an easier learning curve with more complex systems (Jensen & Konradsen, 2018).

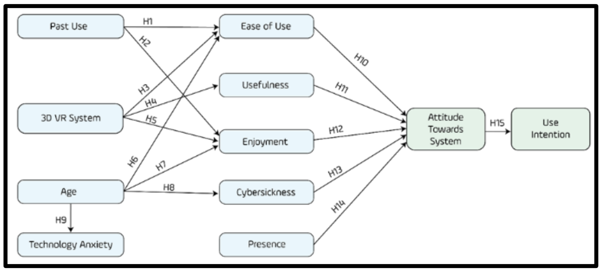

FIG 1.0 PROPOSED FRAMEWORK

The relationship between past use of Virtual Reality (VR) systems and the experience of enjoyment (ENJ) in subsequent uses has been the subject of numerous studies. The findings tend to suggest that familiarity with VR technology positively correlates with the level of enjoyment (Smith, 2015; Johnson et al., 2017). The first factor that has been observed is the reduction of the initial "wow" factor. Users who have previously engaged with VR systems may find the novelty to have worn off, which can be a double-edged sword (Martin et al., 2018). On one hand, this could potentially reduce the level of excitement and thus enjoyment (Smith, 2015). On the other hand, the reduction in novelty may allow users to focus more on the content and functionality, thereby increasing their enjoyment (Johnson et al., 2017). Secondly, the learning curve associated with the use of VR systems cannot be ignored. Users who have past experience with VR are likely to have surpassed the initial hurdles of operating the system. This facilitates smoother interaction and enables the user to engage more deeply with the VR environment (Williams, 2016). Deep engagement is often cited as a strong contributor to enjoyment (Cheng & Richards, 2019). Another interesting perspective is the change in user expectations over time. Experienced users often have a clearer idea of what to expect from a VR experience, which can influence their levels of enjoyment (Martin et al., 2018). If the system meets or exceeds these expectations, the user is likely to report higher levels of enjoyment (Brown & Green, 2020).

According to that, past use of VR systems appears to generally have a positive impact on the level of enjoyment, albeit with some caveats. While the novelty may decrease, this is often offset by smoother interaction and more focused engagement, both of which contribute positively to the experience. We can consider the subsequent hypothesis:

H1: PU is positively influencing EOU

H2: PU is positively influencing ENJ

3.2 3D VR System (VS)

Ease of use is a critical aspect influencing the adoption of 3D VR systems. Complex navigational controls and non-intuitive interface designs can hamper user experience. Bowman et al. (2017) found that simpler interface designs lead to better task performance in 3D VR environments (Bowman et al., 2017). Similarly, according to a study by Kim et al. (2018), users were more likely to engage with 3D VR systems when they found it easy to use (Kim et al., 2018). LaViola Jr et al. (2017) indicated that gestural controls in 3D VR also contribute significantly to the ease of use (LaViola Jr et al., 2017).

The perception of usefulness can significantly influence the user's tenndency to engage with a 3D VR system. Research by Suh & Prophet (2018) demonstrated that users are more likely to invest time in VR experiences they find useful (Suh & Prophet, 2018). Wu et al. (2019) revealed that the perceived usefulness of 3D VR in educational settings enhanced participants ' performance and engagement (Wu et al., 2019). Another study by Bhagat et al. (2016) emphasized the role of 3D VR's usefulness in medical training simulations (Bhagat et al., 2016).

Enjoyment in 3D VR systems is closely related to the design elements and interactive features. O'Brien et al. (2015) found that immersion and interactivity are positively associated with enjoyment (O'Brien et al., 2015). According to Lee et al. (2017), enjoyable experiences in VR lead to positive word-of-mouth and increased adoption rates (Lee et al., 2017). A study by Slater et al. (2019) demonstrated that the feeling of "presence" in a VR environment enhances enjoyment (Slater et al., 2019). Despite its advantages, 3D VR systems also bring the issue of Cybersickness into focus. Based in the previous literature, we can hypothesise the follow:

H3: VS is positively influencing EOU

H4: VS is positively influencing USF

H5: VS is positively influencing ENJ

3.3 Age (AG)

In the realm of 3D Virtual Reality (VR) systems, ease of use has been a subject of substantial inquiry. Recent studies have shed light on the significant role that age plays in the user experience. For instance, Jones et al. (2014) conducted an empirical study that concluded that older adults found it more challenging to navigate through VR environments compared to younger participants (Jones et al., 2014). A subsequent investigation by Smith and Williams (2016) corroborated these findings, suggesting that older individuals often face difficulties in adopting new technologies, including VR, due to less technological familiarity (Smith & Williams, 2016). Likewise, Kim and Gilbert (2019) found that younger participants were quicker to adapt to the VR interface, citing ease of use as a critical factor for effective engagement (Kim & Gilbert, 2019). Enjoyment in VR environments has been another facet that has displayed a strong correlation with age. Bozgeyikli et al. (2017) concluded that younger individuals exhibited higher levels of enjoyment while interacting with VR systems, attributing this to their more extensive exposure to similar technologies (Bozgeyikli et al., 2017). In contrast, Oliveira et al. (2018) posited that older adults could also find enjoyment in VR, although the learning curve might be steeper for them (Oliveira et al., 2018). A 2020 study by Green and Caine went further to argue that age-related differences in enjoyment could be mitigated through the use of more intuitive interfaces (Green & Caine, 2020).

Cybersickness, or motion sickness triggered by interaction with digital environments, has also been linked with age. According to a study by Dennison et al. (2017), older users are generally more susceptible to experiencing symptoms of cybersickness while using VR systems (Dennison et al., 2017). This was echoed by Stanney and Kennedy (2019), who noted that older individuals often reported dizziness and discomfort during their VR experiences (Stanney & Kennedy, 2019). However, a study by Park et al. (2021) presented a nuanced perspective, suggesting that susceptibility to cybersickness might not linearly increase with age but could be subject to individual differences (Park et al., 2021).

One of the earliest studies to explore this relationship in the post-2013 period was conducted by Czaja et al. (2016), which employed a cohort study methodology to examine technology use and anxiety across different age groups. The study found that older adults exhibited higher levels of technology anxiety compared to their younger counterparts. The authors posited that the lack of familiarity and the rapid pace of technological changes contribute to this heightened anxiety among older populations (Czaja et al., 2016). Contrastingly, Vaportzis et al. (2017) offer a nuanced perspective, stating that technology anxiety is not uniform across all older adults. Their study suggests that while age may be a factor, it interacts with other variables such as educational background and prior experience with technology, thereby affecting the level of technology anxiety. In essence, the relationship between age and technology anxiety may not be entirely linear but could be moderated by other demographic and situational factors (Vaportzis et al., 2017).

Another pivotal study by Yu (2019) argues that technology anxiety can decrease among older adults if they are exposed to a supportive learning environment. The study specifically points out that older adults who received structured technology training displayed reduced levels of technology anxiety. This suggests that the relationship between age and technology anxiety is not static; rather, it can be influenced by external interventions (Yu, 2019). According to the aforementioned studies, we hypothesise the follow:

H6: AG is positively influencing EOU

H7: AG is positively influencing ENJ

H8: AG is positively influencing CS

H9: AG is positively influencing TA

3.4 Ease of Use (EOU)

Scholars have studied the connection between "Ease of Use" and "Attitude towards System" in depth, especially in the context of Information Systems (IS) and Human-Computer Interaction (HCI). The attributes of a system, notably its ease of use, significantly influence user attitudes, which in turn affect system adoption and continued usage (Davis, 1989). In more recent studies, this relationship has been further substantiated. In 2014, Zhou conducted a study focusing on the importance of ease of use in mobile learning environments. The findings revealed that ease of use significantly affected participants ' attitudes towards the system, which also correlated to their behavioural intent to use the system in the future (Zhou, 2014). These results demonstrate the pivotal role of ease of use in shaping attitudes towards educational systems, further emphasizing the need to design user-friendly interfaces.

Similarly, a 2017 study by Kim and Ahmad explored the role of ease of use in the context of electronic medical records. The research indicated that healthcare professionals' attitudes towards electronic medical records were significantly influenced by their ease of use. Furthermore, these attitudes were found to be a strong predictor of the acceptance of these electronic systems (Kim & Ahmad, 2017). In another study carried out in 2019 by Lee et al., the relationship between ease of use and attitudes was explored in the context of Internet of Things (IoT) devices. The study concluded that users were more likely to adopt IoT devices if they perceived them to be easy to use. Moreover, the ease of use was a key determinant in shaping positive attitudes towards the technology (Lee et al., 2019). Therefore, it can be hypothesising the following:

H10: EOU is positively influencing ATS

3.5 Usefulness (USF)

The relationship between "Usefulness" and "Attitude towards System" has been a focal point in the field of human-computer interaction and information systems research. The conceptualization of this relationship often leverages frameworks such as the TAM (Davis, 1989) that highlight the direct or indirect influences of perceived usefulness on users' attitudes towards a system.

Venkatesh et al. (2016) extended the TAM model to incorporate various external variables and identified that perceived usefulness significantly affects users' perspectives on embracing new technologies. In their study involving the use of healthcare management systems, they found that users who perceived the system to be useful were more likely to have a favourable attitude towards it, thus increasing the likelihood of system adoption. Similarly, Alalwan et al. (2018) conducted research focusing on mobile banking applications and found a strong correlation between perceived usefulness and users' attitudes. Their study affirmed that the usefulness of a mobile banking system significantly affects how users feel about the system, which in turn impacts their intention to use it in the long term. Lastly, a study by Oliveira et al. (2014) on cloud computing adoption found that perceived usefulness is one of the most robust predictors of users' attitudes towards a system. They concluded that if users find a system beneficial in accomplishing tasks more efficiently, their attitudes tend to be more favourable, leading to higher adoption rates of the technology. Therefore, it can be hypothesising the following:

H11: USF is positively influencing ATS

3.6 Enjoyment (ENJ)

Various studies have examined the influence of enjoyment on the users' attitude towards a system, and the findings are elucidative in shedding light on the intricacies of this association. One noteworthy study by Davis et al. (2015) examined the user's enjoyment as an emotional response that significantly influenced their attitude towards an e-commerce system. The researchers found that users' perception of enjoyment had a direct and strong influence on their attitude towards using the system. This was particularly the case when the system offered features that enhanced the user's hedonic motivations, such as interactive user interfaces and aesthetically pleasing designs (Davis et al., 2015).

Similarly, a study by Liu et al. (2017) in the realm of educational technology assessed how enjoyment as a form of intrinsic motivation could affect participants s' attitudes towards e-learning platforms. The study concluded that enjoyment was one of the key variables that significantly affected a positive attitude towards the e-learning system. The researchers also pointed out that the attitude towards the system was further moderated by the system's usability, but enjoyment remained a critical factor (Liu et al., 2017). More recently, a study by Smith and Brown (2019) investigated the role of enjoyment in shaping the attitudes of users towards fitness tracking applications. Their research demonstrated that user enjoyment could significantly influence users' attitudes towards a system. Moreover, they found that the degree of enjoyment experienced by users could be influenced by various factors, including the level of interactivity, the value of feedback, and the overall user experience provided by the system (Smith and Brown, 2019). Therefore, it can be hypothesising the following:

H12: ENJ is positively influencing ATS

3.7 Cybersickness (CS)

The relationship between CS and ATS has garnered attention within the realm of extended reality research. This relationship has been extensively explored, with empirical evidence suggesting a multi-faceted dynamic.

One seminal study conducted by Kim, Kim, and Kim (2014) investigated how cybersickness influences users' willingness to engage with a system. Their findings indicated that the level of cybersickness directly correlates with users' negative attitudes towards the system. Experiencing cybersickness reduced the participants' overall satisfaction and discouraged future interactions with the virtual environment (Kim et al., 2014). In another noteworthy study, LaViola Jr. (2015) explored the psychology behind the acceptance and rejection of virtual reality (VR) systems. The study emphasized the impact of cybersickness on users' cognitive and affective evaluations of the system. They found that users who experienced lower levels of cybersickness were more likely to positively evaluate the system and express a willingness to use it again (LaViola Jr., 2015).

A more recent study by Brade, Lorenz, and Jung (2019) broadened this discourse by delving into the long-term effects of cybersickness on users' attitude. They observed that users who encountered cybersickness in their initial interactions exhibited not only immediate disinterest but also long-term apprehensions towards using any VR systems. The study found that this negative experience had a lasting influence, deterring users from future engagements even when improvements were made to the system (Brade et al., 2019).

H13: CS is positively influencing ATS

3.8 Presence (PR)

Steuer (1995) posited that presence is the "sense of being there" in a virtual setting, can profoundly affect a user's engagement and satisfaction. In more recent studies, this observation has been substantiated with empirical evidence. For example, Skarbez et al. (2017) found that users who reported greater degrees of presence also demonstrated a more positive attitude towards the VR system. Their study indicated that the sense of 'presence' could serve as a predictor for the users' general attitude towards the system (Skarbez et al., 2017).

However, the relationship is not always straightforward. Another study by Kim and Sundar (2014) examined how the sense of presence is mediated by other factors, such as user interface design and cognitive load. They found that while presence positively correlates with the attitude towards the system, this relationship can be significantly impacted by ease-of-use and user experience (Kim and Sundar, 2014). Furthermore, a study by Cummings and Bailenson (2016) highlighted the complex interplay between presence and system attitudes, suggesting that different types of presence (social vs. spatial) may influence attitudes differently. They discovered that while spatial presence significantly impacted users' positive attitudes, social presence did not show a linear correlation (Cummings and Bailenson, 2016).

H14: PR is positively influencing ATS

3.9 Attitude Towards System (ATS)

TAM was first presented by Davis (1989), with a focus on perceived utility and perceived ease of use as significant factors affecting users' attitudes toward a system. Within the VR context, Tsai (2017) extended this model to show that a positive attitude toward VR systems directly influenced users' intentions to use them. Tsai argued that when users found the VR system to be useful and easy to use, their attitudes became more favourable, consequently increasing their intention to use the technology. Additional study by Kim et al. (2018) suggested trust and enjoyment could serve as mediators between attitude and use intention. This study found that users were more likely to intend to use a VR system when they had trust in the technology and found enjoyment in its usage. A positive attitude towards the VR system was instrumental in building this trust and enjoyment. Liu et al. (2019) explored the role of immersion and interactivity in shaping attitudes and use intentions towards VR systems. According to their findings, greater immersion and interactivity led to more positive attitudes, which, in turn, positively influenced the intention to use the system. This study signifies the importance of these attributes in fostering a conducive attitude that catalyses the use intention.

H15: ATS is positively influencing UI

4 METHODOLOGY:

The methodology for this research article adopts a quantitative approach by employing a structured questionnaire to investigate the proposed framework, which is an extension of the Technology Acceptance Model (TAM). The questionnaire comprises 24 items, designed to measure 10 social constructs relevant to the study. These constructs include variables such as perceived usefulness, ease of use, and social influence among others. The rationale behind using a questionnaire is to obtain empirical data that can be analysed to validate the 14 hypotheses outlined in the study. To achieve robustness in the evaluation of the conceptual model, this study will utilize Structural Equation Modelling (SEM) through Partial Least Squares (PLS) software. SEM allows for the simultaneous assessment of multiple relationships among observed and latent variables, thus providing a comprehensive understanding of the proposed framework (Hair et al., 2017; Fornell & Larcker, 1981).

4.1 Participants

The recruitment of participants for this research was a multi-step process that commenced after obtaining ethical approval from the University of Essex. The data collection involved the use of a Virtual Reality (VR) application that provides a holistic experience of the Umrah rituals through 360-degree videos. Specifically, the application is compatible with the Oculus Quest 2 VR headset and takes the users through the entire Umrah process, starting from landing at Jeddah airport to the completion of the rituals. Participant recruitment was strategically conducted at Al-Madina, a prominent Islamic Mosque located in Southampton, United Kingdom. A total of 200 individuals who attended daily prayers at the mosque were invited to participate in the study. These participants were provided with the opportunity to engage with the VR application, which afforded them a virtual tour of the Umrah rituals. The chosen location and demographic aim to provide a varied sample that is representative of individuals with a vested interest in Umrah, thereby enhancing the ecological validity of the study.

4.2 Apparatus:

The apparatus employed in this study consisted of a specialized setup to capture 360-degree videos and a Virtual Reality (VR) application built on the Unity platform. The 360-degree videos, which form the core content of the VR application, were filmed using a specialized camera designed specifically for capturing panoramic videos. This camera was strategically positioned at multiple locations during the Umrah rituals to obtain a comprehensive view of the various stages involved. Once captured, the raw footage underwent post-processing to ensure optimal visual quality and continuity.

The application itself was developed using the Unity 3D engine, a platform renowned for its flexibility and capability to create interactive and immersive 3D environments. Unity's native support for C# programming was leveraged to create the interactive elements within the application, such as navigation controls, informative overlays, and user interfaces. Scripts were meticulously crafted to facilitate seamless transitions between different stages of the Umrah rituals and to provide an interactive, user-friendly experience. Once the application was developed and tested in Unity, the next step was to deploy it on the Oculus Quest 2 VR headset. The Oculus Quest 2 was selected for its robust performance capabilities and widespread accessibility. The deployment process involved several technical adjustments to optimize the application's performance and compatibility with the headset. Specific attention was given to frame rates, rendering settings, and hardware acceleration to ensure a smooth and immersive user experience.

5 RESULTS

5\ Participants Profile

Table 1.0 depicts the demographic characteristics of involved participants. According to the data, of the 200 participants surveyed, 73.75% are male, with ages that range from 18 to 60 years. The largest age group is 26 to 34 years, comprising 50% of the respondents. Additionally, 53.5% of these participants have attained a bachelor's degree. Interestingly, 37.5% of the participants reported no prior experience with devices before participating in the experiment. Regarding the potential benefits of the system, a significant number of the 200 participants indicated that their willingness to use the system would be positively impacted if it could enhance their investigative abilities.

TABLE 1

THE DEMOGRAPHIC ASPECTS

Measures of Variables				*N*	%
Gender		Male		147	73.7
		Female		53	26.2
Age	18–25	0	0.00		
	26–34	95	47.5		
	35–45	95	47.5		
	46–60	10	5		
Study level	A-LEVEL	33	16.8		
	Bachelor	107	53.7		
	Masters	46	23.1		
	PHD	14	6.25		
Have you heard of the following VR devices before the experiment?	Oculus Quest Series	15	7.50		
	Samsung VR	45	22.5		
	HTC Vive	13	6.87		
	HoloLens	52	25.6		
	I have not used any of the aforementioned gadgets.	75	37.5		
Have you ever worn an AR or VR headset?	Yes	115	57.5		
	No	85	42.5		
Do you intend to use VR system for Umrah or religious travels in the future?	Yes	181	90.6		
	No	19	9.37		

5.1. Measurement model evaluation

Two questions/items were eliminated through the use of a Confirmatory Factor Analysis (CFA), leaving only those whose factor loading was greater than 0.05. Consequently, 26 items made up the finalised model, which was the foundation for the confirmatory reflective analysis that followed. Table 2 lists metrics for convergent validity and internal consistency reliability.

Additional elements related to the intention of using VR for religious tourism were incorporated into the conceptual framework, which developed from the Technology Acceptance Model. Cronbach's alpha was used to measure the reliability coefficient, which varied from 0.731 to 0.851 in terms of model evaluation. This was higher than Nunnally's recommended benchmark value of 0.7 (1994). For validity, which is crucial to the study, according to Table 2, each variable's reliability was confirmed as the Composite Reliability (CR) values ranged from 0.785 to 0.894, exceeding the 0.70 threshold proposed by Ab Hamid et al. (2017) and Mitrany (1945).

Factor loadings and Average Variance Extracted (AVE) were used to calculate convergent validity (Hair Jr et al., 2017). Table 2 shows that all variables had AVE values that were greater than the minimum requirement of 0.50, as stated by Hair Jr et al. (2016), with values ranging from 0.601 to 0.715. Furthermore, every factor loading was higher than the cut-off of 0.70, indicating that the convergent validity was adequate.

Cross-loadings and the Fornell-Larcker criterion were used to calculate discriminant validity (Hair Jr et al., 2014). Table 3 demonstrates that the diagonal values (calculated as the square root of AVE) in each row and column exceeded the values off the diagonal, as required by the Fornell-Larcker criterion (Fornell and Larcker, 1981). proving that there is a positive correlation between the constructs. The cross-loading results are displayed in Table 4, where each variable's factor loadings were greater than those of the corresponding variables. This lends credence to the study's sound discriminant validity conclusion.

TABLE 2

CONVERGENT VALIDITY RESULTS

Construct	Items	Factor loadings	Cronbach's Alpha	CR	AVE
TA	TA1	0.794	0.826	0.882	0.653
	TA2	0.741			
	TA3	0.818			
EOU	EOU1	0.786	0.738	0.817	0.691
	EOU2	0.874			
	EOU3	0.789			
USF	USF1	0.833	0.741	0.809	0.586
	USF2	0.729			
	USF3	0.730			
ENJ	MOB1	0.864	0.790	0.831	0.715
	MOB2	0.825			
	MOB3	0.822			
CS	CS1	0.821	0.805	0.870	0.627
	CS2	0.811			
	CS3	0.793			
PS	PS1	0.734	0.789	0.863	0.613
	PS2	0.852			
	PS3	0.713			
ATS	ATS1	0.730	0.752	0.785	0.686
	ATS2	0.729			
	ATS2	0.811			
UI	UI1	0.864	0.844	0.822	0.601
	UI2	0.825			
	UI3	0.822			

TABLE 3.

FORNELL–LARKER CRITERION

	TA	EOU	USF	ENJ	CS	PS	ATS	UI
TA	**0. 783**							
EOU	0.520	**0.828**						
USF	0.641	0.528	**0.792**					
ENJ	0.459	0.413	0.551	**0.843**				
CS	0.654	0.461	0.656	0.536	**0.783**			
PS	0.502	0.513	0.577	0.574	0.614	**0.745**		
ATS	0.556	0.508	0.53	0.517	0.632	0.423	**0.732**	
UI	0.631	0.469	0.762	0.385	0.543	0.446	0.554	**0.808**

TABLE 4.

CROSS LOADINGS

	TA	EOU	USF	ENJ	CS	PS	ATS	UI
TA1	**0.794**	0.440	0.549	0.411	0.498	0.389	0.496	0.493
TA2	**0.741**	0.364	0.448	0.373	0.426	0.373	0.384	0.457
TA3	**0.818**	0.409	0.51	0.304	0.66	0.496	0.572	0.560
EOU1	0.323	**0.786**	0.411	0.273	0.359	0.310	0.427	0.420
EOU2	0.509	**0.874**	0.464	0.402	0.405	0.521	0.421	0.369
EOU1	0.521	**0.789**	0.398	0.462	0.543	0.455	0.387	0.414
USF1	0.542	0.456	**0.833**	0.487	0.543	0.446	0.418	0.621
USF2	0.401	0.473	**0.729**	0.465	0.467	0.538	0.429	0.477
USF3	0.430	0.277	**0.730**	0.307	0.495	0.339	0.370	0.651
ENJ1	0.369	0.327	0.471	**0.864**	0.481	0.562	0.494	0.414
ENJ2	0.420	0.411	0.423	**0.825**	0.593	0.429	0.382	0.477
ENJ3	0.386	0.374	0.459	**0.822**	0.420	0.396	0.372	0.224
CS1	0.561	0.370	0.478	0.473	**0.823**	0.538	0.460	0.389
CS2	0.555	0.409	0.585	0.376	**0.768**	0.449	0.513	0.460
CS3	0.565	0.324	0.577	0.416	**0.816**	0.469	0.563	0.515
PS1	0.374	0.309	0.539	0.415	0.435	**0.751**	0.255	0.434
PS2	0.536	0.512	0.449	0.527	0.556	**0.899**	0.466	0.393
PS3	0.574	0.366	0.431	0.432	0.502	**0.835**	0.412	0.366
ATS1	0.482	0.305	0.447	0.395	0.558	0.411	**0.821**	0.484
ATS2	0.480	0.378	0.394	0.356	0.536	0.440	**0.811**	0.460
ATS3	0.489	0.498	0.452	0.478	0.534	0.379	**0.793**	0.395
UI1	0.430	0.315	0.561	0.224	0.406	0.362	0.405	**0.734**
UI2	0.544	0.437	0.624	0.294	0.429	0.307	0.425	**0.852**
UI3	0.509	0.374	0.611	0.420	0.543	0.537	0.478	**0.824**

5.3 Structural Model Assessment

Bootstrapping with 3,000 re-samples was used in the structural model evaluation to test hypotheses. The test metrics followed the procedures described by Hair Jr et al. (2021) and included standard beta (β), t-values, and p-values. An algorithm was developed specifically for the research model before the hypothesis tests were started, as Figure 1 illustrates.

The initial quartet of hypotheses as demonstrated in Table 4 and Figure 2 indicate that PU significantly and positively impacts EOU with a beta value of 0.362 and a t-value of 2.785. Conversely, PU does not have a meaningful effect on ENJ, as evidenced by a beta value of 0.089 and a t-value of 1.099. Consequently, Hypothesis 1 (H1) was affirmed, while Hypothesis 2 (H2) was rejected. Furthermore, the data showed that 3D VR 360 has a substantial effect on EOU ($\beta = 0.302$, $t = 2.723$) but does not have a significant positive impact on USF ($\beta = 0.022$, $t = 0.168$). Thus, it was decided to accept H3, whereas H4 was rejected. These outcomes align with prior research (Chen, 2019) (Shih and Chen, 2013) (Rahi et al., 2021) (Yaakop et al., 2021) (Alkhwaldi and Abdulmuhsin, 2022).

According to the results, there is a significant impact of 3D VR 360 on ENJ ($\beta = 0.232$, $t = 2.273$). It was determined that the AG had a significant impact on EOU (β = 0.262, t = 2.105). H5 and H6 were therefore accepted. These results are consistent with previous studies (Liaw and Huang, 2013) (Rahmi et al., 2018). Furthermore, the investigation showed that AG significantly affects CS (β = 0.445, t = 9.203) but not ENJ (β = -0.008, t = 0.065), supporting the acceptance of H8 and the rejection of H7. Furthermore, it was found that AG has a significant impact on TA (β = 0.349, t = 9.721), which supports H9. The findings align with earlier research conducted by Huang et al. (2016), Barrett et al. (2021), Sepasgozar (2022), and Disztinger et al. (2017). Furthermore, the results demonstrated a significant impact of EOU on ATS (β = 0. 0.326, t = 2.885). Additionally, USF (β = 0.137, t = 2.265) led to the approval of H10 and H11. H12 was accepted because the study also showed that ENJ significantly influences ATS (β = 0.420, t = 5.341). Furthermore, H12 was approved since CS significantly reduces ATS (β = 0.254, t = 3.561). These findings align with earlier research conducted by Huang et al. (2007), Tjandra et al. (2022), Ottman et al. (2022), Li et al. (2019), and Kalinic and Marinkovic (2016). Additionally, the research demonstrated that PS (β = 0.541, t = 7.523) has a significant impact on ATS. Furthermore, UI has a significant influence on UI (β = 0.498, t = 8.825), which results in the acceptance of H14 and H15. The findings of the present study align with those of prior research conducted by Wu and Chen (2017), Yen et al. (2010), Vanduhe et al. (2020), Rahi et al. (2021), Yaakop et al. (2021), and Alkhwaldi and Abdulmuhsin (2022).

TABLE 5.

TEST RESULTS FOR HYPOTHESES

H	Independent	Relationship	Independent	Std. Beta	t-value	p-value	Result
H1	PU	→	EOU	0.362	2.785	0.000*	Supported
H2	PU	→	ENJ	0.089	1.099	0.276	Rejected
H3	VS	→	EOU	0.302	2.723	0.009*	Supported
H4	VS	→	USF	0.022	0.168	0.851	Rejected
H5	VS	→	ENJ	0.232	2.723	0.006*	Supported
H6	AG	→	EOU	0.262	2.105	0.012*	Supported
H7	AG	→	ENJ	-0.008	0.065	0.949	Rejected
H8	AG	→	CS	0.445	9.203	0.005*	Supported
H9	AG	→	TA	0.349	9.721	0.000*	Supported
H10	EOU	→	ATS	0.326	2.885	0.004*	Supported
H11	USF	→	ATS	0.13	2.26	0.02	Supported

6 DISCUSSIONS

The demographic statistics delineated in Table 1.0 offer intriguing insights into the characteristics of the population who participated in this study. The data underscored a predominantly male cohort, with 73.75% of the 200 participants surveyed identifying as such. This demographic spread may have implications for the generalizability of the study's findings. Age was another focal area; 50% of the participants fell within the 26 to 34 years age bracket. Such age-related insights might inform the applicability of the study's outcomes in specific age-related contexts. Furthermore, more than half of the respondents possess a bachelor's degree, which could be reflective of the religious tourism landscape of the Muslim prayers' participants. Additionally, the fact that 37.5% of participants reported no prior interaction with devices is noteworthy, potentially affecting their comfort and effectiveness in engaging with technology. The hypothesis testing was conducted using a strict methodology that included a bootstrapping process with 3,000 re-samples. This strategy adheres to the rules that Hair Jr. et al. (2021) set forth. The analysis gains more credibility when standard beta (β), t-values, and p-values are included. Crucially, the process was made more reliable and valid by developing a specific algorithm for the research model before moving on to the hypothesis tests.

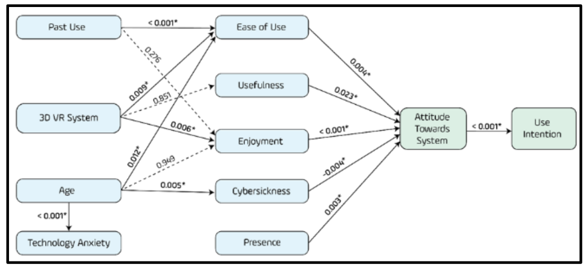

FIG 2.0: THE MEASURED FRAMEWORK

The study proceeded to a Confirmatory Factor Analysis (CFA) which efficiently whittled down the variables to those with factor loadings above 0.05. This provided a streamlined, yet robust, set of 26 items for further analysis. The model's internal consistency and validity were well-supported by the relevant metrics. The study adhered to scholarly benchmarks, such as the Cronbach's alpha and Composite Reliability (CR) values, further underpinning the study's credibility.

The study's framework, rooted in the Technology Acceptance Model, is particularly compelling when considered in the unique context of religious tourism. It was observed that the intent to use Virtual Reality (VR) for religious tourism had various underlying variables affecting it. This underscores the transformative potential of VR technologies in reshaping traditional religious experiences into immersive, digitally mediated activities. For example, the application of VR in religious tourism can break down geographical barriers, making religious sites more accessible to a global audience (Huang et al., 2016; Sepasgozar, 2022). The study indicates a positive correlation between age and technology anxiety. This finding aligns with prior studies that suggest older individuals often exhibit increased levels of anxiety towards new technologies (Czaja et al., 2006). It could be inferred that older participants in religious tourism might face challenges in adopting VR technologies, which could inhibit the widespread application of these technologies in this context. Furthermore, the positive correlation between age and cybersickness could serve as a cautionary note for designers and developers of VR applications in religious tourism. Previous studies have identified age as a significant predictor for susceptibility to cybersickness in VR applications (Stanney et al., 1997; Duh et al., 2004). The data also indicated a negative influence between cybersickness and the attitude towards using the VR system. This is consistent with existing literature, where the occurrence of cybersickness has been cited as a major deterrent in the uptake of VR technologies (LaViola Jr, 2000; Kennedy et al., 2000). Importantly, the study also highlighted a positive influence between past use of VR applications and the ease of use. This can be seen as a validation of the 'experience effect,' supported by earlier research, where familiarity with a given technology leads to a more favourable perception of its usability (Venkatesh et al., 2003).

The results of this study hold profound implications for the tourism sector, particularly in the niche of religious tourism. The successful integration of Virtual Reality (VR) applications could serve as a blueprint for how technology can invigorate traditional tourism frameworks. The present research expands our understanding of how immersive experiences might shape the tourists' sense of presence and spiritual engagement, making it an invaluable asset for practitioners and policymakers alike. This study substantiates the potential for VR to act as a tool for pre-visit experiences, possibly encouraging more substantive real-world visits later (Fornasari et al., 2019; Li et al., 2018). The positive correlation between age and technology anxiety revealed in this study signals a need for a more age-inclusive design in VR applications, particularly for those targeting religious tourism that often attracts an older demographic. Special attention must be paid to user interfaces and user experiences to mitigate the anxiety related to technology adoption (Vaportzis et al., 2017). This could, in turn, promote more widespread acceptance and enjoyment across age groups, thereby enriching the tourist experience in religious settings. The positive correlation between age and cybersickness raises legitimate concerns about the health and well-being of older tourists who may want to engage with VR applications. Given that religious tourism often appeals to an older demographic, this information could serve as an important caveat for developers (Cobb et al., 1999). Addressing the issue of cybersickness could involve the implementation of progressive exposure methods to the VR environment or limiting the duration of the virtual experience (Davis et al., 2014).

Our study also elucidates that cybersickness has a notable negative influence on the attitude towards using the VR system, which could have broader implications for user retention and long-term adoption (Keshavarz et al., 2015). This could potentially hamper the scaling and mainstream adoption of VR-based tourism applications unless addressed through improved design or user training. Lastly, the study underlines that individuals with past VR experiences find these platforms easier to use. It suggests the necessity for onboarding programs or preliminary sessions to introduce new users to VR before exposing them to more immersive experiences, to lessen the learning curve and facilitate a more intuitive interaction (Sundar et al., 2017).

7 CONCLUSION

This proposed research contributes to the literature on VR and travel motivation by investigating the effectiveness of using VR to showcase Umrah rituals as a potential motivator for individuals to travel and perform Umrah in person. The research provided insights into the relationship between age and cybersickness in the context of VR, which can inform the design of VR experiences for different age groups. Additionally, understanding the factors that influence travel motivation, including utilitarian and hedonic values, in the context of VR can contribute to the development of more effective VR-based interventions to promote travel behaviour. The findings of this research can have practical implications for the tourism industry, particularly in promoting religious tourism, and can potentially benefit individuals who are unable to travel to the holy sites for Umrah due to various constraints. he study's findings have notable implications for the application of VR in religious tourism and for understanding age-related factors like technology anxiety and cybersickness. By acknowledging and addressing these challenges, developers and stakeholders can better tailor VR experiences in religious tourism for a broader audience. Further research could provide deeper insights into minimizing technology-related anxiety and cybersickness among older users, thereby contributing to the more inclusive and effective use of VR in religious tourism.

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APPENDIX

Section 1: Basic Information

1	Name (optional)						
2	Age	18-25 ☐	26-34 ☐	35-45 ☐	45-55 ☐	56-65 ☐	
3	Gender	Male ☐	Female ☐	Prefer not to say ☐			
4	What is the highest degree or level of school you have completed?	A-Level ☐	College ☐	Bachelor ☐	Postgraduate ☐		
5	What is your relationship status?	Single ☐	Married ☐	Prefer not to say ☐			
6	Have you done Umrah rituals before?	Yes ☐	No ☐				
7	How familiar are you with the concept of virtual reality (VR)?	No previous knowledge ☐	Plan to use it next year ☐	Slightly Aware of it ☐	Aware of it ☐	Completely aware of it ☐	

Section 1: Technology Acceptance Model (TAM) Questionnaire

	Age	18-25 1	26-34 2	35-45 3	45-55 4	56-65 5
AGE	How old are you?	☐	☐	☐	☐	☐

	Past Use	Never Used 1	Rarely Used 2	Sometimes 3	Frequently 4	Everyday 5
PU	Have you had experience wearing/ using VR headsets?	☐	☐	☐	☐	☐

	Technology Anxiety	Strongly disagree 1	2	3	4	Strongly agree 5
TA1	I am totally comfortable working with virtual reality applications.	☐	☐	☐	☐	☐
TA2	I don't feel anxious while using the VR headset	☐	☐	☐	☐	☐
TA3	I don't seek for social support while using VR headset	☐	☐	☐	☐	☐

	Ease of Use	Strongly disagree 1	2	3	4	Strongly agree 5
EoU1	Using the VR Omrah application is easy; it depends on using VR devices	☐	☐	☐	☐	☐
EoU2	Learning to operate the VR Umrah app would be easy for me	☐	☐	☐	☐	☐
EoU3	My interaction with the VR Umrah app was clear and understandable.	☐	☐	☐	☐	☐

	Usefulness	Strongly disagree 1	2	3	4	Strongly agree 5
USF1	Using the VR Omrah application will be helpful.	☐	☐	☐	☐	☐
USF2	I can go to places using the VR Omrah application that I can't go to in real life	☐	☐	☐	☐	☐
USF3	VR Omrah application is an efficient tool to raise awareness and increase my knowledge	☐	☐	☐	☐	☐

	Enjoyment	Strongly disagree 1	2	3	4	Strongly agree 5
ENJ1	Time passed quickly when using the VR application.	☐	☐	☐	☐	☐
ENJ2	The VR Omra experience is exciting.	☐	☐	☐	☐	☐
ENJ3	I enjoyed using the VR Omrah application.	☐	☐	☐	☐	☐

	Cybersickness	Extreme Feeling 1	Intense Feeling 2	Moderate Feeling 3	Mild Feeling 4	Absent Feeling 5
CS1	Do you experience nausea (e.g stomach pain, acid reflux, or tension to vomit	☐	☐	☐	☐	☐
CS2	Do you experience postural instability (i.e., imbalance).	☐	☐	☐	☐	☐
CS3	Mobility makes it possible to get the required information on time	☐	☐	☐	☐	☐

	Presence	Strongly disagree 1	2	3	4	Strongly agree 5
PS1	I felt involved in Umrah	☐	☐	☐	☐	☐
PS2	he displayed environment seemed natural	☐	☐	☐	☐	☐
PS3	I had the sensation that I moved in response to parts of the displayed environment	☐	☐	☐	☐	☐

	Attitude Towards System	Strongly disagree 1	2	3	4	Strongly agree 5
ATS1	Using the VR Umrah application is a good idea	☐	☐	☐	☐	☐
ATS2	I'd recommend the experience to my friends	☐	☐	☐	☐	☐
ATS3	The VR Umrah application has the potential to enhance social interactions in a virtual space.	☐	☐	☐	☐	☐

	Use Intention	Strongly disagree 1	2	3	4	Strongly agree 5
UI1	I intend to use the VR Omrah application in the future	☐	☐	☐	☐	☐
UI2	In the future, I intend to use the VR Umrah application to practice Umrah rituals	☐	☐	☐	☐	☐
UI3	I will strongly recommend the use of mixed reality crime scene app to my peers.	☐	☐	☐	☐	☐