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From Tradition to Innovation: Evaluating the Effectiveness of Metaverse for Hajj Manasik Training

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Abstract
The Hajj pilgrimage is one of the pillars of Islam that requires spiritual readiness, ritual knowledge, and practical skills. Traditional Hajj rituals training is generally conducted face-to-face, but faces limitations in terms of cost, space, and number of participants. Digital innovations through Virtual Reality (VR) and the metaverse have begun to be introduced, one of which is through the phenomenon of "Virtual Hajj" which went viral. However, academic studies discussing the effectiveness, potential, and challenges of using the metaverse in Hajj education are still rare. This study uses a literature review approach by examining scientific articles, proceedings, research reports, and secondary sources related to the implementation of immersive technology, particularly virtual reality and the metaverse, in religious education and worship simulation. The analysis was conducted by identifying patterns of previous findings, research gaps, and the relevance of the Technology Acceptance Model (TAM) concept and digital religious pedagogy theory in the context of Hajj rituals. The results of the study show that the metaverse has the potential to provide a more immersive learning experience, improve the procedural understanding of pilgrims, and expand global access for prospective pilgrims. However, there are important issues related to the authenticity of religious experiences, technological infrastructure limitations, and ethical and theological debates regarding the legitimacy of virtual world-based worship practices. This study contributes to developing a conceptual perspective on digital transformation in Islamic education, while highlighting the need for future empirical studies to measure the practical effectiveness of the metaverse in Hajj ritual training.

Introduction

The Hajj pilgrimage is one of the pillars of Islam that holds a very important position in the lives of Muslims. (Ahmad Karkarku, 2015) Every year, millions of pilgrims from all over the world gather in Mecca to perform a series of rituals that are rich in spiritual, social, and ritualistic dimensions. The complexity of the Hajj lies in the integration of physical and mental aspects, as well as a technical understanding of the procedures that must be followed in accordance with Islamic law. (Utomo, 2017) Therefore, the training and preparation process before departure, known as manasik hajj, plays a crucial role in ensuring that pilgrims can perform their worship correctly, solemnly, and in accordance with religious guidance (Lestari & Sugiharto, 2021). Manasik Hajj is not only interpreted as technical guidance on the procedures of thawaf, sa'i, wukuf, or tahallul, but also as a process of internalizing spiritual values so that pilgrims understand the meaning behind each ritual (Nurfadillah et al., 2019). Through the rituals, prospective pilgrims acquire cognitive, affective, and psychomotor skills that prepare them to face the dynamics of performing Hajj in the holy land. Thus, the effectiveness of the rituals greatly determines the quality of the Hajj experience (Kartono & Utami, 2023).

Despite its urgency, the implementation of traditional face-to-face Hajj rituals has various limitations. First, cost and logistical constraints often pose obstacles for both organizers and pilgrims.(Sulaiman et al., 2009) Simulating rituals such as thawaf and sa'i requires a large space, a replica of the Ka'bah, and other supporting equipment that not all regions are able to provide. This results in disparities in the quality of guidance between large cities and remote areas.(Probosuseno et al., 2022) Second, limitations in training capacity are also a problem (Mohamed et al., 2016). Every year, the number of pilgrims continues to increase, while the number of guides and training facilities is limited. This situation often results in the manasik process being conducted in large groups, making personal interaction and in-depth guidance difficult to achieve (Yahya et al., 2016). Elderly pilgrims or those with physical limitations also often find it difficult to participate in direct simulation practices (AL-Zahrani & Abdulrahman, 1993). Third, the implementation of traditional manasik is also prone to flexibility issues (Ramli et al., 2021). Pilgrims must be present at the training location at a specific time, which does not always suit their personal circumstances. As a result, some pilgrims only receive minimal guidance and are less prepared when they arrive at the holy land (Haase et al., 2015).

Advances in digital technology have opened up new opportunities in the world of education and training, including in the religious sector (Fikri & Rajiah, 2022). The concepts of Virtual Reality (VR) and Augmented Reality (AR) are increasingly popular in learning because of their ability to provide an immersive experience that is close to reality. In the context of the Hajj pilgrimage, the phenomenon of "Virtual Hajj" has gone viral on various social media platforms (Mohamed et al., 2016). This program provides a

digital simulation of the Hajj pilgrimage using VR devices so that pilgrims can "feel" as if they are actually in the Grand Mosque. This phenomenon has sparked widespread discussion about the possibility of utilizing immersive technology for Hajj training. From a practical standpoint, digital technology can address some of the limitations of conventional methods, such as space, time, and capacity constraints (Mursyid Fikri; Indriana, 2024). Pilgrims can participate in simulations wherever they are, with visual and interactive experiences that are closer to reality. However, the use of VR in Hajj training has so far been limited to trials or technology demonstrations (Sidiq, 2018). There has not been much academic research that systematically evaluates its effectiveness, whether from a pedagogical, spiritual, or socio-religious acceptance perspective. Therefore, there is a need to further explore the potential of a new technology with a broader scope, namely the metaverse.

Although the discourse on virtual hajj and the use of immersive technology has attracted a lot of public attention (Mohd Rahim et al., 2011). academic literature on this topic is still very limited. The majority of previous studies have focused more on: The application of VR/AR in general education (Mohd Rahim et al., 2011) such as medicine, engineering, or science (Tuncsiper et al., 2025). Early studies on the use of mobile applications for worship guidance. Theological analysis or normative opinions on the use of technology in religious rituals. There have not been many studies that specifically highlight the effectiveness of the metaverse as a medium for Hajj training, both in terms of improving procedural understanding, spiritual involvement, and user acceptance. Furthermore, there is no comprehensive conceptual framework linking the metaverse to digital religious pedagogy theory or technology acceptance models such as the Technology Acceptance Model (TAM).

This gap makes this literature review relevant and significant, namely to map the literature, identify opportunities, and develop a conceptual basis for future empirical research.

Methodology

This study uses a qualitative approach with a descriptive-exploratory library research method. The focus of the study is to systematically examine various literature discussing the use of immersive technology, particularly Virtual Reality (VR) and the metaverse, in Islamic education and Hajj simulation. Data sources were obtained from scientific articles, conference proceedings, research reports, and relevant international publications. Literature selection was conducted purposively by considering thematic relevance, including studies on the effectiveness of VR in Hajj training, the application of the metaverse in religious learning, and the integration of digital religious pedagogy concepts and technology acceptance models such as the Technology Acceptance Model

(TAM). Some of the main references include research by Kabir et al. (2021) on VR Hajj and Umrah simulations, Jubba et al. (2024) on Muslim perceptions of the metaverse Hajj, and Niu (2023) who examined virtual Hajj in the context of demographics and geopolitics.

The collected data was then analyzed using content analysis techniques. The analysis process began with the identification of the main themes from each piece of literature, such as the immersive advantages of the metaverse, pedagogical effectiveness, spiritual engagement, technological challenges, and accompanying theological issues. Next, the findings were categorized based on recurring patterns, such as aspects of global accessibility, cost efficiency, and resistance to the legitimacy of digital-based worship practices. After that, the data was synthesized to develop a conceptual framework linking the use of the metaverse with digital religious pedagogy theory and TAM as the basis for technology acceptance.

To maintain data validity, the selected literature was verified through publications in reputable journals and international proceedings, and source triangulation was conducted by comparing findings from various perspectives: technical, pedagogical, and theological. With this method, the study is expected to provide a comprehensive overview of the potential, challenges, and future direction of the use of the metaverse in Hajj training, thereby serving as a conceptual foundation for future empirical research.

Results and Discussion

Hajj Rituals: Tradition and Digital Transformation

The Hajj ritual is a very important learning process for prospective pilgrims so that they can understand the correct procedures for performing the pilgrimage.(Kartono & Utami, 2023) Until now, conventional training models have been conducted through direct simulations guided by Hajj instructors (Owaidah et al., 2023). Pilgrims are taught the practices of thawaf, sa'i, wukuf in Arafah, and throwing jumrah using replicas or miniatures of sacred locations (Yahya et al., 2016). This method emphasizes practical aspects, but its implementation is highly dependent on the availability of space, facilities, and time (Ashif Aminulloh Fathnan et al., 2010). The conventional model faces a number of real obstacles. First, physical limitations often hinder the implementation of simulations, especially in areas far from urban centers. (Sulaiman et al., 2009) Second, the large number of pilgrims makes guidance less personal, so that many pilgrims only receive general training without detailed assistance (Mohamed et al., 2016). Third, elderly pilgrims often find it difficult to participate in intensive physical practices, thereby reducing the effectiveness of learning. This condition emphasizes the need for more inclusive training method innovations. (Ramli et al., 2021)

The development of digital technology has driven transformation in various sectors of education, including religious education (Fikri et al., 2024). Immersive

technologies such as Virtual Reality (VR) have been introduced to simulate the atmosphere of the Grand Mosque, the Kaaba, and other Hajj locations (Sidiq, 2018). With VR, pilgrims can experience the sensation of being in the holy land even though they are physically still in their home country (Kabir et al., 2021). This allows for better spatial and procedural understanding than simply looking at pictures or listening to verbal explanations (Mohd Yasin et al., 2010). In addition to VR, mobile applications are also developing as a medium for worship training. These types of applications provide materials in the form of videos, audio, text, and interactive simulations that can be accessed at any time (Nurhayati et al., 2020). Some applications even come with augmented reality features that help worshipers visualize the steps of worship directly. The use of mobile applications increases the flexibility and accessibility of training, especially for congregants who have limited time or mobility (Shahid, 2012).

Digital transformation in worship training not only facilitates access but also enhances the learning experience for worshippers (Yusoff et al., 2015). Research shows that the use of interactive media can strengthen conceptual understanding while fostering spiritual motivation (Prasetya et al., 2025). With realistic visualizations,(Mulyana & Gunawan, 2010) congregants can more easily imagine the situation in the holy land, thereby increasing their confidence in performing worship (Mohd Yasin et al., 2010). However, the adoption of digital technology in the Hajj rituals still faces a number of challenges. One of them is resistance from some people who are concerned that the use of technology may reduce the sacredness of worship (Battista, 2024). In addition, limited digital infrastructure in some areas makes access to advanced technology uneven (Damayanti et al., 2025). Therefore, the use of technology in the context of worship needs to consider the balance between innovation and religious authenticity (Lehlohonolo Kurata et al., 2024).

The Metaverse, as a further development of VR and AR, offers far greater potential for the digital transformation of the Hajj pilgrimage(Lehlohonolo Kurata et al., 2024). The Metaverse allows pilgrims to interact collectively in a three-dimensional virtual space, rather than just as individuals(Yu, 2022) With digital avatars, pilgrims can perform tawaf together, attend sermons in Arafah, or even discuss with Hajj guides in a virtual environment that resembles the real world (Dr. Pradeep V et al., 2024). The potential of the metaverse as a leap forward from conventional approaches lies in its interactive, collaborative, and immersive nature. Pilgrims not only see simulations, but also experience social interactions as if they were in the holy land with thousands of other pilgrims. This is very important because the Hajj pilgrimage has a collective dimension that cannot be replaced by individual learning(Raman et al., 2024).

Additionally, the metaverse enables global inclusivity. Pilgrims from various countries can join a single virtual space to participate in joint guidance, without being

bound by geographical boundaries (Jubba et al., 2024). This opens up opportunities for international institutions to organize cross-border rituals, while strengthening Islamic brotherhood in the context of digital globalization (Parker et al., 2024). On the other hand, the existence of the metaverse also has the potential to reduce the logistics costs previously required to organize conventional pilgrimages. With all its potential, the use of the metaverse in Hajj pilgrimages must still be studied academically to ensure its effectiveness and legitimacy. Aspects such as pilgrim acceptance, the impact on ritual understanding, and the influence on spiritual experience need to be systematically researched. In this way, digital transformation through the metaverse will not merely be a technological trend, but will truly contribute to improving the quality of Hajj training.

The Potential of the Metaverse for Hajj Pilgrimage

The metaverse is an immersive three-dimensional virtual environment that allows users to interact in real-time through digital avatars (Aswin Oommen Jacob et al., 2023). In the context of religious training, the metaverse has the potential to revolutionize the way people learn and practice, especially in worship with spatial and ritualistic aspects such as Hajj (Mursyid Fikri; Indriana, 2024). This environment enables an immersive experience that is close to reality, without the need for physical presence at a sacred site. This kind of digital transformation provides a new dimension in religious education, expanding the scope of learning and deepening spiritual and procedural meaning (Aulia Mufti et al., 2024). One of the main strengths of the metaverse is its ability to deliver highly realistic and immersive experiences (Hadziq et al., 2024). Users can experience sounds, visuals, and even spatial interactions similar to those in the actual location, such as walking around the Kaaba or performing Sa'i between Safa and Marwa, using devices such as VR headsets or AR overlays. Previous studies on the VR Manasik Hajj application show that immersive media enhances pilgrims' understanding of the sequence and procedures of rituals, as well as strengthens spatial orientation. This indicates that the metaverse can bring real-world experiences into a digital environment with high fidelity.

Emotional and spiritual engagement are important components in performing Hajj. Being immersed in the metaverse allows users to experience a more spiritual atmosphere with sacred room audio, grand mosque architecture, and other avatar interactions that activate a stronger affective experience compared to conventional media such as video or text (Li et al., 2024). This is supported by findings from research on "Virtual pilgrimages" that VR experiences allow individuals to interact more deeply with spiritual spaces (Adria, 2024). The metaverse enables manasik training to be conducted online and globally. This fact allows pilgrims from various countries, even remote areas, to participate in Hajj simulations without having to be physically present. The COVID-19 pandemic era has shown how important this digital solution is, as in the study "Virtual hajj as a response to demographic and geopolitical pressures" by Sung Niu, which

highlights how "virtual hajj" offers educational and spiritual opportunities amid travel restrictions. Thus, the metaverse has the potential to expand the reach of manasik training far beyond geographical boundaries (Niu, 2023).

The use of the metaverse also offers efficiency in terms of cost and time. Physical simulations usually require large spaces, replica facilities, and travel expenses for participants and facilitators. The metaverse minimizes these requirements because it only requires digital devices. Prototype studies such as "Virtual reality training for Hajj pilgrims" by Munshi (2022, tesis Universitas Western Sydney) are in line with what is discussed by Kabir et al (Kabir et al., 2021). These studies show that VR-based training reduces the logistical and time burdens and provides high flexibility for pilgrims. Although it still requires initial technological investment, in the long run, the overall cost can be lower than conventional training. The metaverse enables immersive social interaction in a collective virtual space. Pilgrims can perform rituals such as thawaf, sa'i, and wukuf with other avatars, mimicking the real experience in a group of pilgrims. This interaction is important because Hajj is not only an individual ritual but also a shared experience of thousands of people. The publication "Between Reality and Virtuality: A Study of Muslim Perceptions of Metaverse Hajj as a Religious Practice" (Jubba, Fernando, Larasati, & Darus, 2024) found that Muslims consider this aspect of social simulation to be educational, even though it is not yet considered valid as a physical act of worship (Rahim et al., 2014).

The younger generation, accustomed to digital interactions, tends to be quicker to accept and engage in the metaverse environment. Lin et al. (2022) note that the metaverse in education has great potential in creating an interactive and enjoyable personal learning environment, increasing motivation to learn. This is particularly relevant for manasik training, where the younger generation tends to be more responsive to technology than traditional lecture or physical simulation methods. Despite the metaverse's great potential, there are obstacles that need to be considered. High-quality internet infrastructure and adequate VR devices are not yet evenly distributed across countries, especially in rural areas or developing countries (Zhang et al., 2023). Furthermore, some scholars reject the idea that virtual simulations can be considered equivalent to physical rituals. Findings by Jubba et al. (2024) highlight that many Muslims view virtual hajj as merely educational, not a substitute for the actual obligation of hajj. (Jubba et al., 2024)

Religious contextualization is crucial. Some scholars stipulate that virtual hajj cannot replace the physical obligation because the validity of hajj requires physical presence in the holy land (KSA's religious rulings, reflected in the Turkish context as mentioned in the New Lines Magazine article, 2022). The study by Jubba et al. (2024) shows that pilgrims benefit from metaverse training for preparation, but religiously do

not consider it a valid performance of Hajj. Overall, the metaverse has strong potential as an innovation in Hajj ritual training, with significant advantages in immersive realism, global access, cost and time efficiency, and virtual social interaction. However, its implementation must be supported by infrastructure, accompanied by a clear theological framework, and empirically tested. Further literature research and empirical studies are needed to evaluate how the metaverse can harmoniously integrate into religious education and how to build a spiritually and practically valid model. Ultimately, the metaverse is not a substitute for physical rituals but can be a powerful complement to spiritual preparation.

Challenges and Gaps

The use of the metaverse in Hajj training presents a great opportunity to revolutionize the way pilgrims prepare themselves before departing for the holy land. The immersive three-dimensional virtual environment allows prospective pilgrims to experience spatial and ritualistic experiences that resemble real conditions (Firdaus, 2014). Pilgrims can perform thawaf, sa'i, and wukuf in Arafah interactively without spatial and temporal limitations. This potential is a solution to the classic obstacles of conventional rituals, such as limited facilities, a limited number of guides, and high logistics costs. Thus, the metaverse can expand access to training to remote areas, while also fostering global inclusivity because pilgrims from various countries can participate in one virtual space together (Jufri et al., 2019).

However, behind these opportunities lie serious challenges related to religious legitimacy and the authenticity of spiritual experiences. The Hajj pilgrimage is a pillar of Islam that requires physical presence in the holy land, so virtual simulations cannot replace the actual ritual obligations. Resistance from some scholars and Muslims has arisen due to concerns that the use of technology will reduce the sacredness of worship. The narrative of "virtual Hajj" even has the potential to cause misunderstanding if there are no clear boundaries between educational tools and legitimate worship practices. Therefore, theological aspects need to be studied in depth so that the use of the metaverse remains within the corridor of guidance and education, rather than as a substitute for the Hajj ritual, which is essentially physical in nature.

Apart from the theological dimension, another equally important challenge is the issue of infrastructure and the technology gap. Not all pilgrims have access to VR devices or high-quality internet networks, especially in rural areas or developing countries. This has the potential to create a new gap in the quality of learning, where pilgrims who are economically capable will obtain a more immersive training experience compared to pilgrims with limited facilities. Thus, the success of implementing the metaverse in manasik training depends heavily on technological readiness, government policy support,

and equitable distribution strategies to ensure that this innovation does not become the exclusive domain of certain groups.

Furthermore, the metaverse also poses challenges from a social and psychological perspective for pilgrims. Not all prospective pilgrims, especially the elderly, have sufficient digital literacy to operate VR devices or interact in a virtual world. This obstacle can reduce the effectiveness of training if it is not balanced with a mentoring program. On the other hand, younger generations who are more familiar with technology will find it easier to accept this concept, which has the potential to create a generational gap in the acceptance and utilization of innovation. This analysis shows that in addition to preparing infrastructure, the readiness of human resources is also key to ensuring that this digital transformation is widely accepted.

Although challenging, the long-term opportunities of utilizing the metaverse are significant. With the right approach, the metaverse can be a complementary tool in the Hajj pilgrimage that improves procedural understanding, strengthens spiritual engagement, and expands access to training across geographical boundaries. Its collaborative potential enables the creation of social experiences that resemble collective worship in the holy land, while reducing costs and strengthening the effectiveness of training. Therefore, the implementation strategy must emphasize a balance between technological innovation, theological legitimacy, infrastructure readiness, and sociocultural sensitivity. If these four dimensions can be harmonized, then the metaverse is not merely a digital trend, but a breakthrough that enriches the quality of spiritual preparation for Hajj pilgrims in the era of digital globalization.

Conclusion

This study confirms that the use of the metaverse in Hajj training presents great potential as well as complex challenges. In terms of opportunities, the metaverse is capable of providing a more immersive, interactive, and collective learning experience compared to conventional methods. This innovation not only addresses the limitations of space, time, and cost, but also opens up wider access for pilgrims in various regions, including those in remote areas. With three-dimensional virtual simulations, pilgrims can gain a deeper procedural understanding while strengthening their confidence before performing the Hajj in the holy land.

However, the application of the metaverse also raises a number of important issues. Theological legitimacy is a major challenge because the Hajj ritual requires physical presence in Mecca, so virtual simulations can only be positioned as educational media, not a substitute for worship. In addition, the digital infrastructure gap and limited technological literacy, especially among elderly pilgrims, have the potential to reduce the effectiveness of training if not addressed seriously. Social and ethical resistance also

needs to be considered so that the use of this technology does not cause misunderstandings about the essence of worship.

Conceptually, this research contributes to building a framework for thinking about digital transformation in Islamic education by linking the metaverse to the technology acceptance model (TAM) and digital religious pedagogy. The findings indicate that technological innovation needs to be balanced with spiritual and social sensitivity so as not to obscure the meaning of worship. Therefore, further empirical research is needed to measure the extent to which the metaverse is effective in improving the practical understanding of congregations, as well as their perceptions of the legitimacy and spiritual value of virtual-based training.

Thus, the main conclusion of this study is that the metaverse has great potential as a complement to the Hajj pilgrimage, but it cannot replace the physical nature of worship practices. Its implementation must be placed in the right position, namely as a means of preparation, learning, and internalization of religious values, while still respecting Sharia authority. If this technological integration is carried out carefully, based on a clear theological framework, and supported by adequate infrastructure, then the metaverse can become a strategic innovation that enriches the educational experience of prospective Hajj pilgrims in the digital age.

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