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Traditional Wisdom and Modern Methods in Qibla Direction: A Multicultural Study of Sunan Geseng Great Mosque, Indonesia

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ABSTRACT
The accuracy of the Qibla direction holds paramount importance in Islamic worship practices, particularly in historical mosques where traditional methods intersect with modern calculations. This study examines the case of the Sunan Geseng Great Mosque in Indonesia, established circa 1400 AD, where traditional supernatural methods of Qibla determination converge with contemporary astronomical calculations. This research investigates the historical method of Qibla direction determination and analyzes community perspectives on potential recalibration, examining the balance between preserving historical authenticity and ensuring religious accuracy. This qualitative research employs historical analysis and astronomical approaches. Data collection involved in-depth interviews with six key informants including religious leaders, mosque administrators, and community members, supplemented by astronomical measurements and historical document analysis. Astronomical calculations revealed a 4° 54' 55.5" northward deviation in the mosque's Qibla direction. Historical analysis indicated that the original direction was determined through a supernatural method by Sunan Geseng's teacher. Interview findings revealed three key responses to potential calibration: religious leaders acknowledged the deviation and adjusted prayer rows accordingly; community leaders supported row adjustment without structural changes; and certain community members opposed changes based on ancestral reverence. This study contributes to understanding the dynamics between traditional methods and modern calculations in determining Qibla direction, while providing insights for managing similar cases where religious accuracy intersects with cultural preservation.

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1. INTRODUCTION

The determination of the qibla direction represents a crucial intersection between religious obligation and scientific methodology in Islamic practice (Ahn & Juraev, 2024; King, 1985). In Islamic law, facing the qibla means directing one's entire body towards the Ka'bah in Mecca, which is a prerequisite for the validity of prayer (Shaw, 2021; Suid et al., 2018). This religious imperative has generated various methods of determining the qibla across different cultural and historical contexts. Scholars agree that facing the qibla is a condition for valid worship, making it essential to determine the qibla direction accurately through tested methods (Taufan et al., 2023).

The concept of qibla has been extensively studied from various perspectives within Islamic scholarship. Classical scholars discussed in detail whether Muslims must face the Ka'bah building directly (*'ain al-Ka'bah*) or if facing its general direction (*jihat al-Ka'bah*) suffices. The Hanafi school, for instance, holds that those distant from Mecca need only face the direction of the Ka'bah, not its exact point (Jaelani et al., 2012). This theological discourse provides an important framework for understanding the diverse approaches to qibla determination methods that emerged in various cultural contexts.

Modern studies highlight the evolution and complexity of qibla determination methods. Mustaqim (2020) analyzes modern techniques at Baitul Makmur Mosque that combine traditional and contemporary approaches. Nurmila (2017) examines the application of azimuth and rashdul qibla methods, providing insights into current astronomical calculations. Tanjung (2017) emphasizes the importance of qibla calibration for prayer perfection, demonstrating the urgency of directional accuracy in religious practice. However, research on integrating traditional methods with modern calculations in historical mosques, particularly in Indonesia, remains limited.

This intersection of traditional and modern methods reflects a broader multicultural dynamic in Islamic societies (Fitryansyah, 2024; Nafisah et al., 2024), where various cultural systems—indigenous spiritual practices, Islamic theological principles, and modern scientific approaches—coexist and interact in determining religious practices (Cucchi, 2022; Haluza-DeLay, 2014; Jenkins & Chapple, 2011; Rassool, 2000). The negotiation between these different knowledge systems becomes particularly evident in historical mosques, where communities must balance resp ect for traditional methods, religious requirements, and contemporary scientific understanding.

The Sunan Geseng Great Mosque in Purworejo, Indonesia, established around 1400 AD, presents a compelling case study where traditional supernatural methods of Qibla determination intersect with contemporary astronomical calculations. The mosque's historical significance extends beyond its age, being intimately connected to Sunan Geseng, a prominent figure in Java's early Islamization. In Purworejo's geographical context, which lies east of Mecca, there exists a common assumption among local communities that the Qibla direction is simply westward. This generalization, however, overlooks the complexity of accurate Qibla determination and the unique historical methods employed in establishing the mosque's orientation.

This intersection becomes more complex when examining direct community responses to potential changes in Qibla direction. The mosque administrators' views range from accepting calibration based on astronomical calculations to maintaining traditional orientations, while community members navigate between respecting historical methods and acknowledging modern scientific approaches. Through interviews with religious leaders, mosque administrators, and community members, this study particularly captures the dynamic tension between preserving historical authenticity and adapting to modern astronomical calculations. This tension reflects broader challenges faced by historical mosques across Indonesia, where communities must balance traditional wisdom with contemporary scientific understanding in religious practices.

This research examines the historical method of Qibla direction determination at Sunan Geseng Great Mosque and analyzes its accuracy using modern astronomical calculations. Additionally, it investigates community perspectives regarding potential Qibla recalibration, examining the delicate balance between preserving historical authenticity and ensuring religious accuracy. Through this investigation, the study addresses two fundamental questions: how the Qibla direction was originally determined and how it compares with modern calculations, and what perspectives the community holds regarding potential changes to the historical mosque's Qibla direction.

The significance of this research extends beyond the specific case of Sunan Geseng Great Mosque. It contributes to the broader discourse on integrating traditional wisdom with modern scientific methods in religious practices while preserving cultural heritage. The findings may provide valuable insights for similar cases in other historical mosques, particularly in regions where traditional determination methods intersect with contemporary astronomical calculations. This study thus addresses a crucial gap in our understanding of how historical religious practices can be reconciled with modern scientific approaches while respecting cultural heritage and community perspectives.

2. METHODS

This study employs a qualitative approach with case study design to examine the integration of traditional and modern methods in determining Qibla direction at the Sunan Geseng Great Mosque (Akbar et al., 2022; Budiwati et al., 2022; Thoyfur, 2021). The research framework incorporates multicultural perspectives to understand how different knowledge systems—traditional Javanese wisdom, Islamic principles, and modern scientific methods—interact in religious practices. The selection of qualitative case study design allows for in-depth exploration of the complex interplay between tradition and modernity in religious practices.

The research was conducted at the Sunan Geseng Great Mosque, located in Kauman Barat Hamlet RT 02/RW 06, Bagelen Village, Bagelen District, Purworejo Regency, Central Java Province, Indonesia. The mosque's establishment around 1400 AD makes it a significant historical site where traditional methods of Qibla determination intersect with contemporary needs for accuracy. This location represents a unique cultural intersection, where Javanese traditions, Islamic practices, and modern scientific approaches converge, offering rich insights into the dynamics of religious practice adaptation.

Data collection employed multiple methods to ensure comprehensive understanding of the phenomenon (Prior & Lachover, 2023; Saunders et al., 2023). Primary data was gathered through in-depth interviews in 2021 with six key informants representing different perspectives within the community. These informants included mosque administrators (Zumarudin - religious figure and takmir, Massagus Syamsuddin

- community figure and imam), religious leaders (Sholikhan - imam), and community members (Daroin - local resident, Moh Zamroji - mosque administrator, and Hadi - community educator). Direct observation of the mosque's physical orientation and architectural features complemented the interview data, along with astronomical measurements using modern instruments. Secondary data included historical documents related to the mosque's establishment, technical documentation of previous Qibla measurements, and religious texts on Qibla determination methods.

The analysis followed a systematic approach combining multiple perspectives (Kutlaca et al., 2020; Staszczak-Flavio, 2023). Historical analysis focused on documenting traditional Qibla determination methods and understanding the mosque's cultural context. Astronomical analysis involved calculating Qibla direction using the mosque's geographical coordinates (7° 49' 21.52" South Latitude, 110° 0' 51.15" East Longitude) in relation to the Kaaba's position (21° 25'21.04" North Latitude, 39° 49'34.33" East Longitude), verified through Google Earth and Rashd Qibla observations. Interview data underwent thematic analysis to identify key perspectives and cultural attitudes toward Qibla calibration, with responses categorized and integrated with technical findings.

To ensure research validity, several strategies were employed. Data triangulation was achieved through multiple sources and methods, while member checking with key informants verified interview interpretations. Astronomical calculations were thoroughly documented and cross-checked, and historical data was verified through multiple sources. The research maintained ethical standards through informed consent from all interview participants, respect for local cultural and religious sensitivities, protection of participants' privacy, and transparent communication of research findings to the community. This comprehensive methodological approach enabled a thorough examination of how traditional wisdom and modern methods interact in determining Qibla direction at this historically significant mosque.

3. RESULTS AND DISCUSSION

3.1. Historical Evolution and Traditional Method in Determining Qibla Direction

The Sunan Geseng Great Mosque represents a significant historical intersection of traditional wisdom and Islamic practices in Java, establishing critical evidence of early Islamic architectural and religious developments in Indonesia. Established around 1400 AD/802 H, the mosque's historical significance extends beyond its physical structure, being intimately connected to two prominent figures in Javanese Islamic history: Sunan Geseng and his teacher, Sunan Kalijaga. According to Masagus Syamsuddin, the mosque's establishment coincided with the Islamic propagation activities of these figures in the Bagelen, Magelang, and Kebumen regions, marking it as a crucial site for understanding early Islamic practices in Indonesia.

The mosque's historical narrative reveals interesting layers of cultural and religious integration. While some sources indicate the mosque's establishment around 1400 AD, other historical records documented by an interview with Zumarudin suggest a later formal establishment date of 1732 AD/1144 H, symbolically represented through the planting of specific trees: 17 *kecik* sapodilla trees, 3 mangosteen trees, and 2 velvet sapodilla trees, forming the numerical sequence 17-3-2. This unique method of historical documentation demonstrates the integration of local cultural practices with Islamic institutional development (Norris & Inglehart, 2012).

The traditional method of Qibla determination at the mosque presents a fascinating case study of how early Indonesian Muslims integrated spiritual practices with

directional guidance. According to historical accounts documented by an interview with Masagus Syamsuddin, Sunan Kalijaga employed what local narratives describe as a supernatural approach. The method involved a unique ritual where he stood atop the mosque, holding its peak with his left hand while symbolically "reaching" for the Kaaba's corner with his right hand. This practice, while appearing mystical at first glance, has been subject to more recent analytical interpretations. Nurkhanif et al. (2023) suggests that this method might have actually incorporated astronomical observations, proposing that the "reaching" gesture could have been related to observing the sun's position when it intersected with the Qibla circle.

The preservation of this traditional method in community memory reflects the complex relationship between spiritual authority and technical knowledge in early Indonesian Islam. The method's description combines physical action (climbing the mosque, specific hand positions) with spiritual authority (the figure of Sunan Kalijaga) and divine connection (reaching for the Kaaba), creating a multilayered approach to sacred direction-finding that resonated with local cultural understanding while fulfilling religious requirements (Ahmed & Ali, 2019; Avni, 2007; Tabassum, 2019). This integration of spiritual and practical elements characterizes many aspects of early Indonesian Islamic practices, where religious knowledge was often transmitted through culturally appropriate frameworks that made complex concepts accessible to new converts."

3.2. Modern Astronomical Analysis and Technical Measurement

Contemporary astronomical calculations at the Sunan Geseng Great Mosque required precise geographical positioning and mathematical analysis. The study established the exact coordinates of both the mosque and the Kaaba:
Mosque Location:
Latitude: -7° 49' 21.52" South
Longitude: 110° 0' 51.68" East
Kaaba Location:
Latitude: 21° 25'21.04" North
Longitude: 39° 49'34.33" East

Using these coordinates, a comprehensive spherical trigonometry calculation was performed following standard mathematical formulas for Qibla determination. The calculation process involved several steps:
First, determining the basic angular values:
a = 90° – Place Latitude
b = 90° – Mecca Latitude
C = Longitude difference (Place - Mecca)
This yielded the following values:
a = 90° – (-7° 49' 21.52") = 97° 49' 20.58"
b = 90° - 21° 25'21.04" = 68° 34' 38.96"
C = 110° 0' 51.68" - 39° 49'34.33" = 70° 11'17.35"
The Qibla direction was then calculated using the cotangent formula:
Cotg B = [Cotg b × Sin a – Cos a × Cotg C] / Sin C
This calculation yielded three critical measurements:
Qibla direction from North to West (UB) = 65° 11' 39.74"
Qibla direction from West to North (BU) = 90° - 65° 11' 39.74" = 24° 48' 20.53"
Qibla direction UTSB = 270° + 24° 48' 20.53" = 294° 48' 20.5"

The study's most significant finding emerged from comparing these calculations with the mosque's actual orientation. The mosque's building azimuth was measured at 289° 53' 25". When compared with the calculated Qibla azimuth of 294° 48' 20.5", this revealed a deviation of 4° 54' 55.5" northward from the true Qibla direction.

These findings were validated through multiple modern methods. According to Farikhin (2021), the Head of Syariah Section of the Purworejo Ministry of Religion, while the Hisab and Rukyah Agency (BHR) had never received formal measurement requests from the mosque's takmir management (*Badan Takmirul Masjid / BTM*), the local Religious Affairs Office (KUA) Bagelen had issued a circular and conducted measurements using the sun's shadow method (Rasdul Qibla) on May 26-27, 2020 at 16:17 WIB. Their findings confirmed that the mosque's Qibla direction deviated westward with a northern slant, corroborating the mathematical calculations of this study.

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Further verification was conducted using Google Earth application and additional Rashd Qibla observations, which consistently confirmed the calculated deviation. The precision of these calculations and their validation through multiple methods provides a solid scientific basis for understanding the mosque's Qibla orientation deviation. This technical analysis aligns with contemporary Islamic scholarly perspectives on the importance of accurate Qibla determination, as emphasized by interview with Tanjung in discussions of prayer validity requirements.

3.3. Community Response and Cultural Dynamics

The community's response to the Qibla direction findings presents a complex interplay of traditional values and modern scientific acceptance. The research revealed two distinct perspectives within the community, each representing different approaches to balancing religious accuracy with historical preservation. These responses demonstrate how cultural and religious values influence the acceptance or resistance to scientific measurements in religious practices.

According to Zumarudin, a religious figure and mosque takmir, practical adjustments have already been implemented based on the Rashd Qibla calculations conducted on May 27, 2020. The prayer rows were realigned to accommodate the correct Qibla direction, though he noted that some congregants continue to follow the original orientation. This partial adoption of the new direction reflects the ongoing negotiation between traditional practices and modern calculations within the community.

A supportive perspective came from Massagus Syamsuddin, who, as both a community figure and mosque imam, positively received the scientific validation of the Qibla direction. His acceptance was based on the corroboration between the researcher's findings and the mosque takmir's own Rashd Qibla measurements, demonstrating how scientific evidence can reinforce religious practice when properly communicated and validated through multiple sources.

A pragmatic middle-ground approach was proposed by interview with Sholikhan, suggesting that while the prayer rows should be adjusted to the correct direction, the mosque's physical structure should remain unchanged to preserve its historical value. This position represents a practical compromise between religious requirements and cultural preservation, acknowledging both the importance of accurate prayer direction and the historical significance of the mosque's architecture.

However, resistance to change was also evident in the community. Interview with Daroin emphasized the mosque's historical and "sacred" value, advocating for maintaining the original Qibla direction as determined by previous generations. This perspective highlights the deep cultural attachment to traditional practices and the role of ancestral wisdom in religious matters. The resistance reflects a broader concern about preserving cultural heritage in the face of modern technological interventions (Muthuswamy & Esakki, 2024; Silverman, 2010).

A more balanced perspective was offered by Moh Zamroji, who noted that while Qibla direction should align with Islamic law requiring facing either 'ain al Kaaba or jihat al Kaaba, any changes must be implemented with careful consideration of community understanding. His emphasis on the need for proper communication with the congregation before implementing changes demonstrates awareness of the social dimensions of religious practice modifications (Bartunek, 1984; Knickmeyer, 2020; Paloutzian et al., 1999)."

Adding to these perspectives, Hadi, an educator from Krendetan Purworejo, emphasized the theological importance of verifying the Qibla direction's accuracy. His position stems from the understanding that correct Qibla direction is a fundamental requirement for prayer validity, highlighting the need for rigorous verification of existing directional alignments.

3.4. Integration Challenges: Bridging Traditional Wisdom and Modern Methods

The integration of traditional wisdom and modern astronomical methods in determining Qibla direction at the Sunan Geseng Great Mosque presents several complex challenges that reflect broader issues in religious practice modernization. These challenges emerge at the intersection of historical preservation, religious accuracy, and community acceptance, requiring careful consideration of multiple perspectives and approaches.

The primary challenge lies in reconciling the supernatural method historically attributed to Sunan Kalijaga with modern astronomical calculations. Nurkhanif et al. (2023) analysis suggests that what appears as a purely supernatural approach might have incorporated early forms of astronomical observation, indicating that traditional and scientific methods may not be as disconnected as they initially appear. This interpretation offers a potential bridge between historical practices and modern calculations, suggesting that contemporary astronomical methods might be viewed as refinements of, rather than replacements for, traditional approaches.

A second significant challenge involves the practical implementation of changes while maintaining community cohesion. The varying responses from community members, from acceptance to resistance, demonstrate the need for careful management of change processes. As evidenced by Sholikhan's suggestion to adjust prayer rows without altering the building structure, practical compromises can help bridge the gap between tradition and modernity. This approach allows for the preservation of historical architecture while ensuring proper religious practice.

The study also revealed an interesting dynamic in how religious authority is perceived and negotiated. While some community members like Daroin emphasize the authority of historical figures and traditional methods, others like Zamroji argue for integrating modern scientific understanding with religious requirements. This tension reflects a broader challenge in Islamic societies: balancing respect for traditional authorities with the need for accurate religious practice in light of modern capabilities (Alicino, 2015; Baroudi, 2016; Berg & Denison, 2013; Smither & Khorsandi, 2009).

The case of the Sunan Geseng Great Mosque provides valuable insights into how historical mosques can adapt to modern requirements while preserving their cultural heritage. The community's experience demonstrates that successful integration of traditional and modern methods requires: (1) Clear communication of scientific findings; (2) Respect for historical and cultural values; (3) Practical compromises that preserve architectural heritage; (4) Community involvement in decision-making processes; (5) Recognition of both traditional wisdom and modern scientific accuracy

These findings contribute to the broader discourse on religious practice modernization in traditional societies, suggesting that integration rather than replacement of traditional methods might provide more sustainable solutions for religious communities facing similar challenges (Abbas et al., 2024)."

The case of the Sunan Geseng Great Mosque demonstrates the complex interplay between traditional wisdom and modern methods in determining Qibla direction in historical mosques. The findings reveal multiple layers of interaction: from the historical method of Qibla determination that potentially incorporated early forms of astronomical observation, to the precise modern calculations showing a 4° 54' 55.5" deviation, and finally to the diverse community responses reflecting various approaches to balancing tradition with accuracy. The research demonstrates that successful integration of traditional and modern methods requires more than just technical accuracy; it demands careful consideration of cultural preservation, community values, and practical implementation strategies. The mosque community's experience in negotiating these challenges provides valuable insights for other historical mosques facing similar issues of modernization while preserving their cultural heritage. Perhaps most significantly, the study reveals that the apparent dichotomy between traditional wisdom and modern methods may be less stark than initially perceived, suggesting possibilities for meaningful integration that respects both historical legacy and contemporary requirements for religious practice accuracy.

3.5. Determining the Qibla Direction in a Multicultural Context: A Study of Sunan Geseng Grand Mosque

The study of determining the qibla direction at Sunan Geseng Grand Mosque reflects how local traditions and modern demands interact within the multicultural framework of Indonesian society. This mosque, heavily influenced by Sunan Geseng and his mentor, Sunan Kalijaga, symbolizes the integration of local wisdom, Islamic principles, and traditional methods passed down through generations. This discussion will explore how traditional approaches and modern technology contribute to determining the qibla direction and how these approaches can be harmonized.

Sunan Kalijaga, a pivotal figure in the Islamization of Java, played a crucial role in mentoring Sunan Geseng, particularly in employing spiritual and symbolic methods to determine the qibla. According to Hasan et al. (2023), Pranata et al. (2021) and Warisno

(2017), traditional methods employed at Sunan Geseng Grand Mosque often relied on natural markers and spiritual elements, reflecting respect for local wisdom.

These methods not only served as tools for determining prayer direction but also acted as mediums for education and proselytization. For instance, the symbols used by Sunan Kalijaga were rooted in local beliefs, facilitating acceptance by the Javanese community at the time. This adaptability demonstrates Islam's flexibility in accommodating local cultures, as noted by Tibi (2005), who argues that Islam possesses the capacity to incorporate cultural elements without compromising its core teachings.

However, these traditional methods are often regarded as supernatural in the modern context. Some view these approaches as less relevant in an era where technology has significantly advanced. This poses a unique challenge, particularly in a continually evolving multicultural society. Lowenthal (2013) observes that traditional methods still hold significant value as cultural heritage that warrants preservation.

Technological advancements have made it easier to achieve precision in determining the qibla direction. Tools such as Google Earth and Rashd Qibla methods enable Muslims to ascertain the qibla direction with a high degree of accuracy. Hope & Jones (2014) highlights that these technologies provide practical solutions for those seeking certainty in their worship practices.

However, modernity often clashes with local communities' values, which prioritize the preservation of historical and ancestral practices. Henrich (2001) points out that adopting modern technologies without considering cultural sensitivities can provoke resistance among communities deeply rooted in tradition. In the case of Sunan Geseng Grand Mosque, this tension is evident in how the community responds to modern astronomical calculations that reveal minor deviations in the qibla direction.

Some community members, like Massagus Syamsuddin, advocate for adjusting the prayer rows based on astronomical calculations, provided the mosque's structure remains unchanged. This pragmatic stance aims to accommodate modernity without sacrificing traditional values. Conversely, others, like Daroin, resist such changes due to the mosque's sacred significance and respect for ancestral heritage.

In a multicultural context, creating participatory dialogue spaces is crucial for enabling all stakeholders to express their views. Westoby & Dowling (2013)asserts that dialogical approaches can help mitigate tensions between tradition preservation and modern demands. In the case of Sunan Geseng Grand Mosque, community discussions play a pivotal role in finding solutions that honor ancestral heritage while addressing modern spiritual needs.

One proposed approach is "cultural alignment," wherein modern technology does not replace tradition but enhances it by providing clearer scientific foundations. Sholikhan, a local figure, suggests adjusting prayer rows without altering the mosque's physical structure. This approach allows for the preservation of traditional values while embracing the precision of modern calculations.

This study is not only locally relevant but also contributes to global discourse on Islam in multicultural societies. Flexible approaches to determining the qibla, such as the 'jihat al-Ka'bah' concept from the Hanafi school of thought, underscore Islam's capacity to adapt to various cultural and geographical contexts. Moberg (2002) notes that this concept provides a foundation for understanding how religious practices can be adapted without compromising their spiritual essence.

The experience of Sunan Geseng Grand Mosque demonstrates how Indonesian Muslims can blend local traditions with globalization's demands. This approach also

illustrates that modernizing religious practices requires not only technical accuracy but also openness to local values.

An important aspect of this study is the documentation of traditional methods used by Sunan Geseng and Sunan Kalijaga. By incorporating modern calculations, cultural heritage previously transmitted orally can be preserved in more permanent forms. Moberg (2002) emphasizes that such documentation provides opportunities for future generations to understand religious practices within a holistic context.

For instance, integrating traditional and modern approaches can serve as educational tools for younger generations. By understanding the historical and scientific backgrounds of qibla determination, they can appreciate ancestral heritage while leveraging modern technology to enhance their religious practices.

This multicultural study on determining the qibla direction at Sunan Geseng Grand Mosque demonstrates that integrating local wisdom and modern methods not only enriches religious practices but also strengthens cultural identity. In an ever-changing society, it is essential to create dialogue spaces that allow tradition and modernity to complement each other.

Sunan Geseng Grand Mosque exemplifies how communities can honor ancestral heritage while utilizing scientific advancements to fulfill spiritual needs. This experience offers valuable lessons on how Islam can adapt to multicultural contexts without losing its essence. Thus, this study is not only significant for local communities but also contributes to the global discourse on Islam and multiculturalism.

4. CONCLUSION

This study demonstrates that the integration of traditional wisdom and modern methods in determining Qibla direction requires a nuanced understanding of both technical accuracy and cultural sensitivity. The research achieved its objectives by documenting the historical method of Qibla determination at Sunan Geseng Great Mosque, establishing a 4° 54' 55.5" northward deviation through precise astronomical calculations, and analyzing diverse community responses to potential recalibration. The findings reveal that successful integration of traditional and modern approaches depends on three key factors: technical precision in measurements, respect for historical preservation, and community engagement in decision-making processes. The study shows that while modern astronomical calculations provide accurate directional guidance, implementation of changes must consider the cultural and historical significance of traditional methods. The community's varied responses, ranging from acceptance of row adjustments to resistance based on ancestral reverence, highlight the importance of balanced approaches in modernizing religious practices. This research contributes to the broader understanding of how historical mosques can maintain their cultural heritage while adapting to contemporary requirements for worship accuracy. The findings suggest that rather than viewing traditional and modern methods as opposing approaches, they can be integrated through careful consideration of both technical precision and cultural preservation, providing a model for similar cases in other historical religious structures.

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