

Common Approaches, Diverse Challenges: A Civilizational Perspective on Global Hijri Calendar Practices

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Abstract

The Muslim community is diverse, and this greatly shapes how the Hijri calendar is practiced around the world. This paper explores the civilizational factors behind the different ways Muslim-majority and minority countries determine the start of the Hijri month. Drawing from a literature review, this study examined how factors such as administration, geography, culture, religious traditions, and technology influence the practice of determining the new Hijri month. The study demonstrated how the achievements of Islamic civilization, especially in astronomy and timekeeping, continue to play a role in current debates between traditional moon sighting (Ru'yah) and astronomical calculation (hisab). By comparing examples from Southeast Asia, the Middle East, Africa, Europe, and Australia, the study aims to furnish valuable insights to scholars and administrators seeking to develop a uniform approach for defining the Hijri calendar on national, regional, or international levels through an analysis of these characteristics. The report provides valuable guidance for decision-making processes, fostering enhanced mutual understanding and collaboration among Muslim groups.

Keywords: Civilization, Geography, Determination, Location, New Hijri Month

Introduction

Currently, Islam ranks as the second-largest religion globally, boasting an estimated 2 billion followers. Followers of Islam are dispersed across diverse regions, with significant concentrations in central and northern Africa, the Middle East, and Southeast Asia. Notably, Muslim communities dominate the populations of countries such as Indonesia, Egypt, Afghanistan, Syria, Pakistan, Turkey, and Iran, accounting for approximately 90% or more of their populations.¹ The geographical distribution of Muslims worldwide is depicted in Figure 1.

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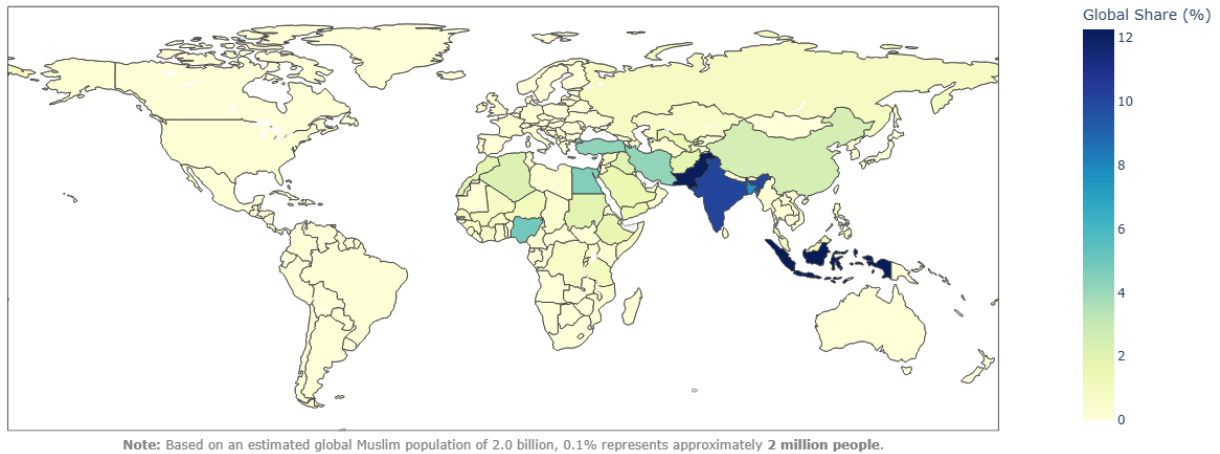
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¹ Pew Research Center., "How the Global Religious Landscape Changed From 2010 to 2020," Pew Research Center, 2025, <https://www.pewresearch.org/religion/2025/06/09/how-the-global-religious-landscape-changed-from-2010-to-2020/>.

Figure 1: Distribution of Muslim Percentage Worldwide

Figure 1: Distribution of Muslim Percentage Worldwide



Distribution of Muslim Percentage Worldwide²

The Muslims use lunar crescent visibility to determine the start of the new Hijri month. The new Hijri month begins of the lunar crescent is sighted on the 29th day of the Hijri month. That current Hijri month lasts until the 30th day if the lunar crescent is not sighted on the 29th day of a Hijri month. During the time of the prophet, the determination of the new Hijri month is exclusively through the new moon sighting.³ Today, the new Hijri month is determined by either moon sighting, astronomical calculation, or a lunar crescent visibility criterion. However, the practical details vary from one country to another.⁴

The Hijri calendar also finds practical applications in contemporary times. It is used in various administrative and legal contexts in Muslim-majority countries, such as determining the dates of public holidays, legal contracts, and official documents, with Saudi Arabia as instance where Hijri calendar is used on official government documents.⁵ Additionally, many Muslim-majority countries use the Hijri calendar alongside the Gregorian calendar in daily life, particularly for religious and personal events. Therefore, accurate determination of the Hijri calendar, especially concerning significant months such as Ramadan, Shawwal, and Zulhijjah, is vital. For example, accurate determination of the beginning and end of Ramadan, the month of fasting, allows businesses and organizations in Muslim-majority countries to plan their manpower effectively. During Ramadan, working hours and schedules may be adjusted to accommodate the religious observance of fasting, ensuring productivity while respecting employees' religious obligations.⁶

² Pew Research Center., "How the Global Religious Landscape Changed From 2010 to 2020."

³ Mohd Saiful Anwar Mohd Nawawi et al., "Hijri Month Determination in Southeast Asia: An Illustration Between Religion, Science, and Cultural Background," *Heliyon* 10, no. 20 (2024): e38668, <https://doi.org/10.1016/j.heliyon.2024.e38668>.

⁴ Nazhatulshima Ahmad et al., "Analysis Data of the 22 Years of Observations on the Young Crescent Moon at Telok Kemang Observatory in Relation to the Imkanur Rukyah Criteria 1995," *Sains Malaysiana* 51, no. 10 (2022): 3415–22, <https://doi.org/10.17576/jsm-2022-5110-24>; Muhamad Syazwan Faiz et al., "Islamic Historical Review on Middle Age Lunar Crescent Visibility Criterion," *Journal of Al-Tamaddun* 17, no. 1 (2022): 109–25.

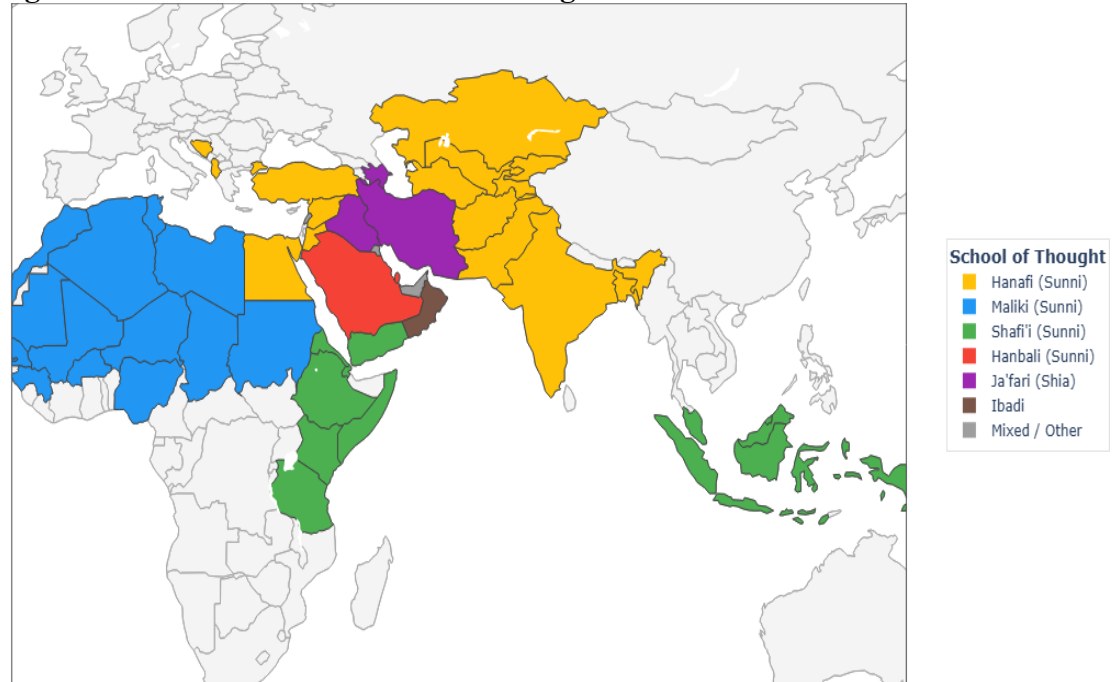
⁵ Zaki Mostafa, "Lunar Calendars: The New Saudi Arabian Criterion," *The Observatory* 125 (2005): 25–30.

⁶ Raihana Abdul Wahab et al., "An Analysis of Takwim Hijriah Khairiah in the Context of Historical Development of the Malaysian Hijri Calendar," *Journal of Al-Tamaddun* 20, no. 2 (2025): 335–43, <https://doi.org/10.22452/JAT.vol20no2.23>.

Similarly, planning for the Eid al-Fitr holiday at the eve of Shawwal and Zulhijjah requires knowledge of the precise dates to arrange staffing levels and operational activities accordingly.⁷

Moreover, industries and businesses that rely on raw materials or commodities may need to adjust their procurement and inventory management based on the timing of religious months such as Ramadan, Shawwal and Zulhijjah.⁸ For example, food and beverage manufacturers may increase production in anticipation of higher demand during Ramadan, while livestock breeders and distributors may plan for increased sales and consumption of cow, camel, and buffalo meat during Eid al-Fitr and Eid al-Adha.⁹

Figure 2: Various School of Islamic Thought Over the World



Various School of Islamic Thought Over the World¹⁰

The Muslim community around the world is not bound to a single set of values or a single culture. Instead, their identities hail from a variety of ethnic and cultural backgrounds, each with its own traditions and customs.¹¹ These diverse backgrounds could influence how Muslim communities interpret and practice the determination of the new Hijri month. In addition, national governments

⁷ Louay Fatoohi, *First Visibility of the Lunar Crescent and Other Problems in Historical Astronomy*, 1998; M. Ilyas, "Lunar Crescent Visibility Criterion and Islamic Calendar," *Quarterly Journal of Royal Astronomical Society* 35 (1994): 425–61.

⁸ Muhammad Ridzuan Hashim et al., "Unification of Hijri Calendar Under One Matla': A Case Study of MABIMS Through the Lens of Islamic Jurisprudence and Astronomy," *Jurnal Fiqh* 22, no. 2 (2025): 389–433, <https://doi.org/10.22452/fiqh.vol22no2.7>.

⁹ Abdul Mufid and Thomas Djamaluddin, "The Implementation of New Minister of Religion of Brunei, Indonesia, Malaysia, and Singapore Criteria towards the Hijri Calendar Unification," *HTS Teologiese Studies / Theological Studies* 79, no. 1 (2023), <https://doi.org/10.4102/hts.v79i1.8774>.

¹⁰ Pew Research Center, "The Future of World Religions: Population Growth Projections, 2010-2050," Pew Research Center, April 2015, <https://www.pewresearch.org/religion/2015/04/02/religious-projections-2010-2050/>.

¹¹ Nezahat Altuntaş, "Religious Nationalism in a New Era: A Perspective from Political Islam," *African and Asian Studies* 9, no. 4 (2010): 418–35, <https://doi.org/10.1163/156921010X534805>; Carool Kersten, *A History of Islam in Indonesia*, A History of Islam in Indonesia (2017), <https://doi.org/10.3366/edinburgh/9780748681839.001.0001>.

and religious authorities may have distinct policies and guidelines, influenced by historical, political, and social contexts,¹² and this impacts their understanding with regard to Hijri month determination. Understanding and appreciating this diversity is essential for gaining insights into the complexities of Hijri calendrical practices.

Most of the research on the practice of new Hijri month determination is limited to discussions at the individual country level. This includes the work on Malaysia,¹³ Indonesia,¹⁴ Brunei,¹⁵

¹² Fenella Fleischmann and Karen Phalet, "Identity Conflict or Compatibility: A Comparison of Muslim Minorities in Five European Cities," *Political Psychology* 37, no. 4 (2016), <https://doi.org/10.1111/pops.12278>; Rachel Jardine et al., "Analysis of Covid-19 Burden, Epidemiology and Mitigation Strategies in Muslim Majority Countries," *Eastern Mediterranean Health Journal* 26, no. 10 (2020), <https://doi.org/10.26719/emhj.20.120>.

¹³ Nazhatulshima Ahmad et al., "A New Crescent Moon Visibility Criteria Using Circular Regression Model : A Case Study of Teluk Kemang , Malaysia," *Sains Malaysiana* 49, no. 4 (2020): 859–70, <https://doi.org/10.17576/jsm-2020-4904-15>; Iknor Azli Ibrahim et al., "Functions of Astrofiqh Observatories in Malaysia in Solving Astrofiqh Issues," *Mediterranean Journal of Social Sciences* 6, no. 1S1 (2015): 112–19, <https://doi.org/10.5901/mjss.2015.v6n1s1p112>; Mohd Saiful Anwar Mohd Nawawi et al., "Sejarah Kriteria Kenampakan Anak Bulan Di Malaysia," *Journal of Al-Tamaddun* 10, no. 2 (2015): 61–75, <https://doi.org/10.22452/JAT.vol10no2.5>; Mohd Saiful Anwar Mohd Nawawi et al., "Hadith Rukyah Dan Hisab Dari Perspektif Astronomi Dan Berdasarkan Amalan Di Malaysia Dan Indonesia," in *Sunnah Nabi : Realiti Dan Cabaran Semasa*, ed. Fauzi Deraman et al. (Jabatan Al-Quran & Hadith, University Malaya, 2011); Mohd Saiful Anwar Mohd Nawawi et al., "Pemikiran Imam Taqī Al-Dīn Al-Subkī (683/1284-756/1355) Berkaitan Kriteria Kenampakan Anak Bulan," *Jurnal Syariah* 28, no. 1 (2020): 1–30, <https://doi.org/10.22452/js.vol28no1.1>; Nurul Kausar Nizam et al., "Penggunaan Teleskop: Kesan Terhadap Hukum Ithbat Kenampakan Anak Bulan Di Malaysia," *Jurnal Fiqh* 11 (2014): 55–74; Mohd Saiful et al., "Application of Scientific Approach to Determine Lunar Crescent ' s Visibility," *Middle -East Journal of Scientific Research* 12, no. 1 (2012): 96–100, <https://doi.org/10.5829/idosi.mejsr.2012.12.1.1672>; Mohd Saiful et al., "Kenampakan Anak Bulan Di Teluk Kemang : Analisis Mengikut Pandangan Fiqh Oleh Yusuf Al-Qaradawi," *Jurnal Syariah UM* 21, no. 1 (2013): 63–74; Mohd Zambri Zainuddin et al., "Analisis Perbandingan Unjuran Kalendar Berdasarkan Kriteria Altitud 2 Darjah and Elongasi 3 Darjah Dengan Kriteria Altitud 3 Darjah Dan Elongasi 5 Darjah [Comparative Analysis of Calendar Projections Based on 2 Degree Altitude and 3 Degree Elongation Crit," *Jurnal Falak* 1 (2015); Mohd Nawawi et al., "Hijri Month Determination in Southeast Asia"; Mohd Nawawi et al., "Hijri Month Determination in Southeast Asia"; Muhammad Syazwan Faiz et al., "Alteration of Twilight Sky Brightness Profile by Light Pollution," *Scientific Reports* 14, no. 1 (2024): 26682; Faiz et al., "Alteration of Twilight Sky Brightness Profile by Light Pollution."

¹⁴ Susiknan Azhari, *Kalendar Islam : Ke Arah Integrasi Muhammadiyah-NU [Islamic Calendar: Towards Muhammadiyah-NU Integration]* (Museum Astronomi Islam, 2012); Susiknan Azhari, "Gagasan Menyatukan Umat Islam Indonesia Melalui Kalender Islam [The Idea of Uniting Indonesian Muslims Through the Islamic Calendar]," *AHKAM : Jurnal Ilmu Syariah*, ahead of print, 2015, <https://doi.org/10.15408/ajis.v15i2.2869>; Susiknan Azhari, "Cabaran Kalendar Islam Global Di Era Revolusi Industri 4.0," *Jurnal Fiqh* 18, no. 1 (2021): 117–34, <https://doi.org/10.22452/fiqh.vol18no1.4>; Jayusman and Oki Dermawan, "Fiqh Al-Ihtilaf and Science : Discourse of Preliminary Differences of Lunation in Indonesia," *Karsa* 26, no. 2 (2018): 251–71, <https://doi.org/10.19105/karsa.v26i2.1829>; Abu Yazid Raisal, "Berbagai Konsep Hilal Di Indonesia [Various Hilal Concepts in Indonesia]," *Al-Marshad: Jurnal Astronomi Islam Dan Ilmu-Ilmu Berkaitan*, ahead of print, 2018, <https://doi.org/10.30596/jam.v4i2.2478>; Ahmad Adib Rofiuiddin, "Dinamika Sosial Penentuan Awal Bulan Hijriah Di Indonesia [Social Dynamics of Determining the Beginning of the Hijri Month in Indonesia]," *Jurnal Hukum Dan Ekonomi Islam* 18, no. 2 (2019): 233–54.

¹⁵ Mohd Shukri Hanapi and Shahir Akram Hassan, "Basis for Using the Rukyah Method for Determining the Arrival of Ramadan and Syawal in Brunei Darussalam," *Journal of Islamic Studies and Culture*, no. August 2016 (2015): 2, <https://doi.org/10.15640/jisc.v3n2a2>; Shahir Akram Hassan and Mohd Shukri Hanapi, "Standard Operating Procedure (Sop) in Determining the Arrival of Shawwal in Brunei Darussalam," *Social Sciences and Humanities Journal* 10, no. 10 (2015): 27–36; Ahmad Wahidi et al., "Implementation of the Mabims Criteria in Determining the Beginning of Islamic Month in Indonesia and Brunei Darussalam," 529 (2021), <https://doi.org/10.2991/assehr.k.210421.016>.

Singapore,¹⁶ Nigeria,¹⁷ Pakistan,¹⁸ South Africa,¹⁹ Saudi Arabia,²⁰ Thailand,²¹ Libya,²² United States of America,²³ United Kingdom,²⁴ Australia,²⁵ and Turkey.²⁶ This demonstrate that a broader, cross-regional analysis is currently lacking. While some research does compare the practice of determining new Hijri months across multiple countries, this focus is primarily on Brunei, Indonesia, Malaysia, Singapore, due to their bond under Religion Minister Meeting of Brunei, Indonesia, Malaysia and Singapore (MABIMS). This is demonstrated in Figure . Cross regional research focusing solely on these countries, while valuable, creates a narrow perspective as this country primarily share the same language, school of Islamic thought, and cultural identity.

To achieve a truly comprehensive understanding of how Hijri month determination varies globally, research that encompasses practices across a wider range of Muslim countries, throughout the world is necessary, including Muslim minority country. This exemplifies the research gap on the underlying factor of diverse practice of new Hijri month determination.

¹⁶ Mohd Saiful Anwar Mohd Nawawi, "Penilaian Semula Kriteria Kenampakan Anak Bulan Di Malaysia, Indonesia Dan Brunei" (University of Malaya, 2014).

¹⁷ Abdulmajeed Bolade Hassan-Bello, "Sharia and Moon Sighting and Calculation Examining Moon Sighting Controversy in Nigeria," *Al-Ahkam* 30, no. 2 (2020): 215–52; Sani Abu Bakar Lugga, *Moon Sighting Controversies* (Lugga Press Ltd, 2014).

¹⁸ A. Rehman et al., "Observational Issues of New Moon Sighting in Pakistan," *Pakistan Journal of Meteorology* 12, no. 24 (2016): 37–56.

¹⁹ Goolam Vahed and Thembisa Waetjen, "Moon Sightings and the Quest for Muslim Solidarities in Twentieth Century Natal.," *New Contree*, no. 71 (2014).

²⁰ T. Alrefay et al., "Analysis of Observations of Earliest Visibility of the Lunar Crescent," *The Observatory* 138, no. 1267 (2018); Ayman Kordi, "The Psychological Effect On Sighting of The New Moon," *Observatory*, 2003, 219–23; Mostafa, "Lunar Calendars: The New Saudi Arabian Criterion"; Zaki Mostafa, "The Possibility of Seeing Two Crescent Moons in One Day and the Interpretation of Disappearance of the Crescent by Sheikh Al-Islam," *Journal of King Saud University - Science* 22, no. 1 (2010): 51–55, <https://doi.org/10.1016/j.jksus.2009.12.008>.

²¹ Nur Aida Athirah Sulaiman and Shahir Akram Hassan, "The Application of Rukyah and Hisab in Determining the Starting Dates of the Months of Ramadhan and Syawal in Thailand," *International Journal of Academic Research in Business and Social Sciences* 8, no. 4 (2018): 788–802.

²² Fadhahilal A'mal, "Study of Islamic Astronomics: Methods and Criteria of Rukyat Hisab Determining the Beginning of the Month in Libya," *Proceeding of International Conference on Sharia and Law* 1, no. 1 (2022): 60–64; A. H. Hassan and Yasser A. Abdel-Hadi, "Naked Eye Determination of the Dawn at Tubruq of Libya Through Four Years Observations," *Middle-East Journal of Scientific Research* 23, no. 11 (2015).

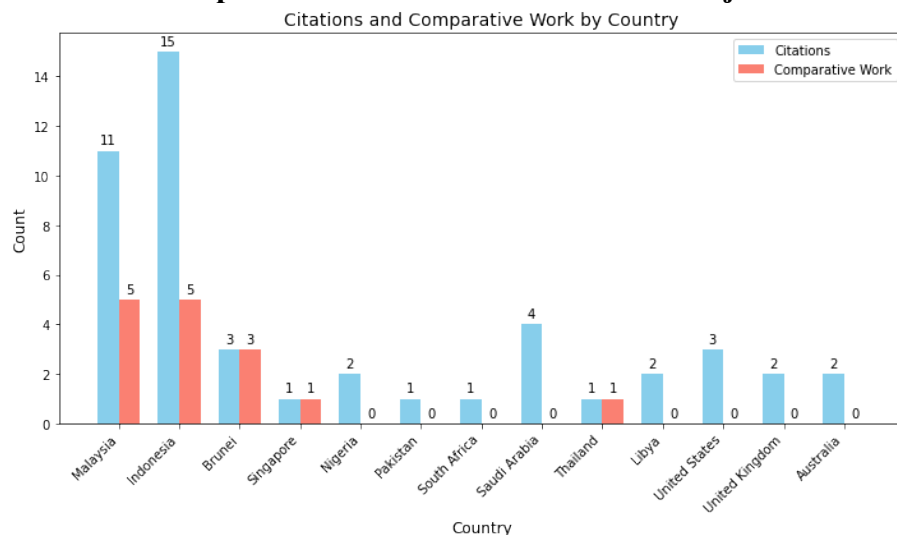
²³ Abdus Sattar Ghazali, "Islamic New Year 1437 Continues the Lunar Calendar Controversy," *The Milli Gazette*, October 25, 2015, <https://www.milligazette.com/news/islamic-perspectives/13217-islamic-new-year-1437-continues-the-lunar-calendar-controversy/>.

²⁴ Wifaqul Ulama, "British Moon Sighting Criteria, Process & System," *Wifaqul Ulama*, 2022, <https://www.wifaqululama.co.uk/criteria/>; Yusuf Danka, "The History of the UK Following the Saudi Arabia Moonsighting Decision," Croydon Mosque & Islamic Centre, 2010.

²⁵ Ikramullah Ahmed et al., *The Practice Of Australian Muslims On Moonsighting Beginning Of Ramadan And Eid* (Sydney, 2023); Fatmawati et al., "Determination of Islamic Month Start by Moonsighting Australia (Case Study: 1 Dzulhijah 1441)," *Journal of Islamic Thought and Civilization* 12, no. 2 (2022): 225–41, <https://doi.org/10.32350/jitc.122.16>.

²⁶ Rofiuddin, "Dinamika Sosial Penentuan Awal Bulan Hijriah Di Indonesia [Social Dynamics of Determining the Beginning of the Hijri Month in Indonesia]."

Figure 3: Citation and Comparative Work on Practice of New Hijri Month Determination



There are a number of approaches to categorize the various factors of new Hijri month determination under a few broad umbrella terms. However, classifying the factors into three categories; (1) culture and governance, (2) geographical limitations, and (3) human error, could provide a clearer framework for understanding the complexity of the diverse practices of new Hijri month determination. Administrative structures within countries often play a crucial role in the implementation of policies related to religious practices, including the determination of the Hijri month. Government bodies, religious authorities, and legal institutions may be responsible for overseeing the official method of determining the Hijri month, whether it's based on moon sighting, astronomical calculations, or a combination of both. Administrative decisions can have a profound impact on how the Hijri calendar is observed and practiced at a societal level. Geographical location influences the visibility of the lunar crescent, which is central to the determination of the new Hijri month in many traditions. Factors such as latitude, longitude, altitude, light pollution, population density, climate and atmospheric conditions can affect the sighting of the moon. As a result, the method of determining the Hijri month may vary from one region to another based on local lunar visibility patterns. Human factors encompass a wide range of considerations, including confirmation bias, religious beliefs, and individual attitudes that impact lunar crescent observance. The willingness and ability of individuals within a community to participate in moon sighting activities, as well as their acceptance of alternative methods such as astronomical calculations, can influence the overall method of determining the Hijri month. Human factors also encompass issues of accessibility, education, tribalism, cultural norms and religious authority, which may affect community engagement with the Hijri calendar and its associated practices. Therefore, this paper examines new Hijri month determination from three perspectives: geographical limitations, human factors, and culture/governance. Ultimately, the goal is to offer a new angle on this issue and provide insights to help future policymakers and Islamic scholars navigate the complex debate surrounding Hijri month determination.

Research Methodology

Research Design and Epistemological Framework

This study employs a qualitative, exploratory research design grounded in an interpretivist and constructivist epistemology. Recognizing that the determination of the Islamic lunar calendar transcends pure astronomical calculation or juristic debate, this framework approaches calendrical practice as a complex, socially constructed civilizational phenomenon. By utilizing a qualitative

methodology, the study seeks to answer critical “how” and “why” questions, specifically, why neighboring nations using identical astronomical parameters arrive at divergent conclusions. This approach highlights that the declaration of a new month is a negotiated outcome, deeply influenced by local administrative frameworks, historical sectarian lineages, and regional environmental constraints.

To systematically investigate these variables, the study utilizes a cross-regional, comparative design integrated within a Systematic Literature Review (SLR). This framework deliberately addresses the “methodological nationalism” prevalent in existing literature, which has historically isolated its focus to singular nations (e.g., Saudi Arabia, Malaysia, or the UK) or narrow regional blocs. Specifically, the study critiques comparative research that restricts its scope to the MABIMS region (Brunei, Indonesia, Malaysia, and Singapore). Because these nations share similar linguistic, cultural, and jurisprudential (*Shāfiʿī*) roots, such localized studies fail to adequately capture global civilizational diversity or the impact of varying geographic climates and different Islamic schools of thought (such as the *Hanafī* or *Mālikī* traditions).

By deliberately shifting the analytical perimeter, this methodology encompasses a globally representative dataset. This expansive scope allows for a dynamic juxtaposition of practices between Muslim-majority nations with centralized religious authorities and Muslim-minority populations in the West, where the absence of state-level religious governance alters the calendrical landscape entirely. Ultimately, this qualitative, comparative approach is essential for mapping the global interactions of administrative decisions, human fallibility, and geographic constraints, thereby generating robust theoretical constructs that explain the root causes of modern calendrical disunity.

Systematic Literature Review Methodology

This study’s literature retrieval and selection were executed in strict adherence to the PRISMA 2020 guidelines. The comprehensive search spanned multidisciplinary databases, utilizing Scopus for high-impact empirical scientific literature and Google Scholar to capture essential “grey literature,” such as institutional policies, real-time calendrical conflicts, and governmental decrees. Advanced Boolean strings were deployed using core concepts like “Governance,” “Geography,” and “New Hijri Month,” alongside specific jurisprudential and scientific terms like *ruʿyah al-hilāl* and “light pollution,” ensuring a comprehensive historical and contemporary mapping of the topic.

Rigorous inclusion and exclusion criteria were established to mitigate selection bias and isolate texts addressing the civilizational, geographic, and human factors of Hijri calendar practices. Included literature had to explicitly connect calendrical determination to societal or administrative variables across specific comparative regions, including Muslim-majority areas in Southeast Asia and the Middle East, as well as Muslim-minority populations in the West. Crucially, in accordance with PRISMA mandates, the review strictly excluded purely technical astrophysics studies, such as those focused on algorithm design or telescopic hardware calibration, along with out-of-scope geographies and unsubstantiated opinion pieces, ensuring the focus remained squarely on socio-political and geographical research questions.

The final study selection followed a highly systematic pipeline encompassing identification, deduplication, screening, and eligibility assessment. During the primary phase, titles and abstracts were evaluated against the predefined criteria, immediately filtering out purely technical astronomical algorithms. In the secondary phase, the full texts of provisionally included reports underwent granular evaluation, with any discrepancies regarding sociological or historical relevance resolved through mediated discussion to guarantee high reliability before compiling the

final dataset for analysis. Some of the selected article that used for this study systematic literature review are listed in Table 1.

Table 1: Work on Practice of New Hijri Month Determination

Country	Published Work
Malaysia	Ahmad et al., 2020; Ibrahim et al., 2015a; Mohd Nawawi et al., 2015; Nawawi et al., 2011; Nawawi, Wahid, Man, Ahmad, & Nir, 2020a, 2020b; Nawawi, Wahid, Man, Ahmad, & Niri, 2020; Nizam et al., 2014; Saiful et al., 2012, 2013; Zainuddin et al., 2015
Indonesia	Azhari, 2012a, 2015a; Jayusman & Oki Dermawan, 2018; Mufid, 2020; Muh. Arif Royyani et al., 2022; Raisal, 2018a; Rofiuddin, 2019a
Brunei	Hanapi & Hassan, 2015a; S. A. Hassan & Hanapi, 2015a; Wahidi et al., 2021
Singapore	Nawawi, 2014
Nigeria	Hassan-Bello, 2020; Lugga, 2014a
Pakistan	Rehman et al., 2016
South Africa	Vahed & Waetjen, 2014
Saudi Arabia	Kordi, 2003a; Mostafa, 2005a, 2005b, 2010
Thailand	Sulaiman & Hassan, 2018
Libya	A'mal, 2022; A. H. Hassan & Abdel-Hadi, 2015
United States	Abdus Sattar Ghazali, 2015a; FCNA, n.d.; Mawlana Shakeelur Rahman, n.d.
United Kingdom	Ulama, 2022; Yusuf Danka, 2010a
Australia	AHMED et al., 2023; Fatmawati et al., 2022
Turkey	Rofiuddin, 2022

Data Analysis and Thematic Synthesis

This study employed Reflexive Thematic Analysis, adapted into a “Thematic Synthesis” framework.²⁷ Acknowledging the researcher’s active role in knowledge production, the process began with a deep immersion into the dataset to identify recurring regional contradictions, such as the communal acceptance of astronomically impossible moon sightings. This initial familiarization transitioned into an exhaustive, free line-by-line coding process. Texts detailing historical, sociological, and environmental variables were meticulously deconstructed into granular conceptual tags, such as [unverified human testimony], [institutional identity marker], and [high overcast frequency], to isolate the precise causal mechanisms behind localized calendrical disputes.

Following the coding phase, these disparate labels were clustered into broader initial themes based on their shared theoretical trajectories and sociological impacts. For example, individual codes relating to sensory deception and a lack of astronomical validation were grouped to highlight human perceptual limits, while structural codes illustrating organizational conflicts formed a separate cultural cluster. To ensure maximum methodological rigor, these initial groupings underwent a strict two-tiered review process. This review sharpened the thematic boundaries,

²⁷ Virginia Braun and Victoria Clarke, “Using Thematic Analysis in Psychology,” *Qualitative Research in Psychology* 3, no. 2 (2006): 77–101, <https://doi.org/10.1191/1478088706qp0630a>; James Thomas and Angela Harden, “Methods for the Thematic Synthesis of Qualitative Research in Systematic Reviews,” *BMC Medical Research Methodology* 8, no. 1 (2008): 45, <https://doi.org/10.1186/1471-2288-8-45>.

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guaranteeing that the final themes moved beyond merely listing superficial regional differences and instead captured the profound, foundational root causes driving global Hijri calendar variations.

This rigorous iterative process culminated in the crystallization and reporting of three definitive analytical themes: The Human Error Aspect, which highlights the systematic fallibility of unverified visual observation; The Culture and Governance Aspect, which demonstrates how institutional “selection bias” and sectarian lineage dictate calendrical acceptance; and The Geographical Limitation Aspect, which emphasizes how immutable physical realities, like equatorial monsoons or severe urban light pollution, dictate methodological viability. By weaving these three defined themes into a cohesive academic narrative, the study successfully transformed localized historical anecdotes into actionable, cross-regional theoretical constructs that explain the complex civilizational drivers of global Islamic timekeeping.

Result and Discussion Regarding Variability Factors of New Hijri Month Determination

Human Error Aspect in New Hijri Month Determination

Ru'yah al-hilāl (lunar crescent sighting) is inherently dependent on human observation, and human perception is, by nature, fallible. The Prophet Muḥammad ﷺ explicitly acknowledged human limitation in matters of observation when he stated: “*We are an unlettered community; we neither write nor calculate. The month is like this and this*”,²⁸ indicating reliance on direct human sight while simultaneously recognising its constraints. This inherent human weakness means that reports of lunar crescent sightings are susceptible to error, misjudgement, and inconsistency.²⁹

The notion of human perceptual limitation and the potential for observational error is deeply embedded within the foundational texts and historical precedents governing Islamic calendrical practice. The Prophet Muhammad (ﷺ) explicitly addressed the constraints and vulnerabilities of human visual perception in the definitive *ṣaḥīḥ* tradition regarding moon sighting: “Fast when you see it, and break your fast when you see it; but if it is obscured from you, then complete the number of thirty [days]”.³⁰ This prophetic injunction inherently acknowledges that sensory perception cannot always yield absolute certainty, establishing a systematic fail-safe when direct visual observation is compromised.

Furthermore, classical Islamic jurisprudence illustrates the fallibility of human sight through a well-documented historical incident involving the venerable Companion Anas bin Mālīk. At an advanced age, Anas claimed to have sighted the new moon, only for the presiding authority to discover that a curved white hair from his own eyebrow had fallen across his field of vision, creating an optical illusion. Once the hair was brushed away, the “moon” vanished. Consequently, lunar crescent sightings have historically required rigorous mechanisms of authentication to mitigate error, either through strict jurisprudential rules requiring multiple corroborating witnesses, or through modern mathematical and astronomical validation techniques.³¹

²⁸ Muḥammad ibn Ismā‘īl al-Bukhārī, *Ṣaḥīḥ al-Bukhārī*, trans. Muhammad Muhsin Khan (Riyadh: Darussalam, 1997), vol. 3, hadith 1913.

²⁹ Ibn Hajar Al-‘Asqalani, *Fath Al-Bari Bi-Sharh Sahih al-Bukhari : Wa-Ma`ahu Tawjih al-Qari `ila al-Qawa'id Wa-Fawa'id al-Usuliyah Wa-al-Hadithiyah Wa-al-Isnadiyah*, ed. Abd al-‘Aziz ibn ‘Abd Allah Ibn Baz. (Darul Fikir, 1993).

³⁰ Muḥammad ibn Ismā‘īl al-Bukhārī, *Ṣaḥīḥ al-Bukhārī*, trans. Muhammad Muhsin Khan (Riyadh: Darussalam, 1997), vol. 3, hadith 1909.

³¹ Abū al-Faraj ‘Abd al-Raḥmān Ibn al-Jawzī, *Kitāb Al-Adhkiyā’* (Dar al-Qalam, 1985).

These methods serve as critical safeguards to compensate for inherent human limitations and to enhance the reliability of crescent sighting reports, particularly when challenging atmospheric conditions or isolated testimonies introduce uncertainty. Scholars from the major Islamic legal schools demonstrate diverse positions regarding the number and qualifications of witnesses required for authenticating lunar crescent sightings. The Shāfi'ī school generally requires testimony from at least two just individuals, with scholars such as Imām al-Shāfi'ī and al-Juwaynī rejecting single-witness reports.³² Within the Ḥanafī school, opinions vary by context: a single witness may suffice for the commencement of Ramaḍān, while Shawwāl requires witnesses of proven integrity; under clear sky conditions, some scholars, such as al-Ghunaymī, mandate testimony from a large group as a precaution against uncertainty.³³ The Ḥanbalī school similarly requires two witnesses, with additional safeguards such as sworn testimony before a judge,³⁴ whereas Mālikī scholars range from accepting one or two witnesses to requiring a large, trustworthy group whose agreement precludes collusion, particularly under favorable observation conditions.³⁵

In contemporary scholarship, methodological approaches have been introduced to complement juristic requirements through astronomical validation. Ramadhan, Djamaluddin, and Utama proposed a quantitative reduction parameter to authenticate lunar crescent visibility reports and minimise observational error.³⁶ While this approach aims to systematically verify the credibility of reported sightings, subsequent analysis by Faïd et al. has identified instances of misclassified sighting reports within the observational database.³⁷ These findings highlight that, despite advances in methodological verification, both classical jurisprudential criteria and modern astronomical validation remain subject to critical evaluation and refinement in the determination of lunar crescent visibility.

Another recurring challenge involves cases of false positive lunar crescent sightings, which occur when a crescent is reported as visible but is later determined, through post-observational evaluation, to have been impossible to observe. Such false positive cases arise when the reported crescent is positioned extremely close to the horizon, rendering naked-eye visibility implausible, or when the Moon has already set below the horizon at the claimed observation time. These issues were particularly prevalent in the early 2000s, a period during which the systematic use of digital imaging and verification techniques was not yet widespread.³⁸ Although contemporary lunar

³² Abd al-Malik bin Abdullah bin Yusuf bin Muhammad Al-Juwaini, *Iḥayyah Al-Matlab Fi Dirayah al-Madḥḥab*, vol. 4 (Dar al-Minhaj, 2007); Abdullah Muḥamad bin Idris Asy-Syafī'e, *Al-Umm [The Exlempar]* (Victory Agencie, 1989).

³³ Abi al-Layth Naṣr ibn Muḥammad ibn Ibrahim al-Samarqandi, *Fatawa Al-Nawazil* (Dar al-Kutub al-'Ilmiyyah, n.d.); al-Ghanimi Abd al-Ghani al-Ghunaymi al-Dimashqi al-Maydani al-Hanafī, *Al-Lubab Fi Sharh al-Kitab* (Dar Ihya' al-Turath al-'Arabi, 1998).

³⁴ Mansur ibn Yunis ibn Idris al-Bahuti, *Kashshaf Al-Qina an Matn al-Iqna* (maktabat al-nasr al-Haditha, 1999); Ibn Hanbal, Abu 'Abd Allah Ahmad bin Muḥammad bin Hanbal, *Masail Ahmad Bin Hanbal Riwayah Ibnuhu Abdullah* (Al-Maktab al-Islami, 1981).

³⁵ Al-Ashabi, Malik bin Anas bin Malik bin 'Amir, *Al-Mudawwanah*, I (Dar al-Kutub al-'Ilmiyyah, 1994); Al-Baghdadi, Abu Muḥammad Abd al-Wahhab bin 'Ali, *Al-Talqin Fi al-Fiqh al-Maliki* (Dar al-Kutub al-'Ilmiyyah, 2004).

³⁶ T. B. Ramadhan et al., "Reevaluation of Hilaal Visibility Criteria In Indonesia by Using Indonesia and International Observational Data," *Proceeding of International Conference On Research, Implementation And Education of Mathematics and Sciences* (Yogyakarta), 2014.

³⁷ Muḥamad Syazwan Faïd et al., "Confirmation Methodology for a Lunar Crescent Sighting Report," *New Astronomy* 103 (October 2023): 102063, <https://doi.org/10.1016/j.newast.2023.102063>.

³⁸ Ebrahim Moosa, "Shaykh Aḥmad Shākir and the Adoption of a Scientifically-Based Lunar Calendar," *Islamic Law and Society* 5, no. 1 (1998): 57–89; Mohammad Ilyas, *A Modern Guide To Astronomical Calculations Of Islamic Calendar*, *Times And Qibla*. (Berita Publishing, 1984).

crescent observations increasingly rely on digital imagery and instrumental documentation to support visual claims, false positive reports continue to surface in cases where sightings are asserted without corroborating digital evidence.³⁹

An example of unauthenticated reports of lunar crescent sightings can be located in Malaysia and Indonesia records of the lunar crescent sighting. There are several unverified and arguable reports of lunar crescent sighting in Malaysia and Indonesia records, particularly record that predates 1985. There are cases where these unvalidated reports are used to determine the new Hijri month. It was found that some of the data are impossible to be sighted when compared to the visibility limit by numerous lunar crescent visibility researchers. This shows that as humans report lunar crescent visibility, errors such as invalidated reports have shown to become a primary issue for adopting lunar crescent sightings for new Hijri month determination. Such arguable reports of lunar crescent sightings are listed in Table 2.

Table 2: Selected Data of Arguable Reports of Lunar Crescent Sighting

Location	Date	Moon Altitude	Elongation	Moon Age	Limiting Naked Eye Parameter
Perak, Malaysia	11 June 1983	1° 52'	1° 55'	6.08	Altitude = 4.0 Elongation = 7.5 Age = 10
Banda Aceh, Indonesia	25 April 1990	1° 26'	6° 02'	7.19	

Arguable reports of lunar crescent sightings occur not only in Malaysia and Indonesia but also in other countries. Kordi (2003) found out that in Saudi Arabia, at least 24 false-positive reports of lunar crescent sightings are accepted for new Hijri month determination. Salman (2006) published another piece of literature on incidents of arguable reports in Saudi Arabia, demonstrating that their number of lunar crescent sightings is reported to be visible. However, it is located below the horizon. This trend was also found in Pakistan in August 2011 and Nigeria in November 2017, where the lunar crescent was reported to be sighted. However, the lunar crescent is calculated below the horizon and is impossible to be sighted.⁴⁰ Unauthenticated data of lunar crescent sightings, and false positive lunar crescent visibility reports, which are the product of human error, lead to divergence in determining the dates of the new Hijri month within a country. This is as evidence in Malaysia in 1983 and has been a current dilemma in Indonesia and Australia. The list of current ongoing and recorded divergence due to human error of new Hijri month determination are portrayed in Table 3.

³⁹ J. A. Utama et al., "Young Lunar Crescent Detection Based on Video Data with Computer Vision Techniques," *Astronomy and Computing*, June 2023, 100731, <https://doi.org/10.1016/j.ascom.2023.100731>.

⁴⁰ Faïd et al., "Confirmation Methodology for a Lunar Crescent Sighting Report."

Table 3: Cases of Divergence in Hijri Month Determination Across Selected Regions

Region/Country	Year/Period/Source	Main Actors/Institutions	Method Applied	Point of Divergence	Key Issue Identified	Impact
Malaysia	1983 (Ramaḍān) ⁴¹	State religious authorities of Perak & Johor vs other Malaysian states	Local moonsighting	Perak and Johor began Ramaḍān on 12 June 1983, while other states began on 13 June 1983	Lunar crescent reportedly sighted on 11 June 1983 was later deemed invalid due to extreme geometric parameters	Disunity in Ramaḍān commencement among Malaysian states
Indonesia	Current	Government, NU, Muhammadiyah, and other Islamic bodies	Mixed: moonsighting & calculation	Ramaḍān and Shawwāl differed at least 20 times	Presence of false-positive lunar crescent sightings and methodological differences	Frequent national-level divergence in major Islamic observances
Pakistan	Shawwāl 2021 ⁴²	Ministry of Information & Broadcasting vs Ruet-i-Hilal Committee	Calculation vs moonsighting	Government announced Eid on 14 May 2021, while Ruet-i-Hilal declared Eid on 13 May 2021	Dispute over crescent visibility with moon age 13h 44m, considered impossible by astronomers but accepted by Ruet-i-Hilal (175 claimed sightings)	Public confusion and institutional disagreement

⁴¹ Azhari, “Gagasan Menyatukan Umat Islam Indonesia Melalui Kalender Islam [The Idea of Uniting Indonesian Muslims Through the Islamic Calendar]”; Mohd Nawawi et al., “Sejarah Kriteria Kenampakan Anak Bulan Di Malaysia.”

⁴² Naila Inayat, “Pakistan Is Confused about Thursday Eid. And Fawad Chaudhry Is at Its Centre,” ThePrint, May 13, 2021, <https://theprint.in/opinion/letter-from-pakistan/pakistan-is-confused-about-thursday-eid-and-fawad-chaudhry-is-at-its-centre/657614/>; Abdul Naseer and Shakeel Ur Rahman, “المكانة الشرعية للجان رؤية هلال المختلفة والتقويم القمري: دراسة تحليلية وبحوثية: The Sharia Status of Different Crescent Moon Sighting Committees and Lunar Calendar—An Analytical and Research Study,” *Al-Duhaa* 2, no. 02 (2021): 39–52.

North America	Since 2006; major case in 2015 ⁴³	FCNA, ISNA vs Central Hilal Sighting Committee of North America	Calculation (FCNA/ISNA) vs moonsighting (CHSCNA)	Hijri year 1437 declared on 14 Oct 2015 by FCNA/ISNA, vs 15 Oct 2015 by CHSCNA	Disagreement on visibility of crescent on 13 Oct 2015	Many mosques across USA, Canada, Caribbean followed different start dates
United Kingdom	Since 1980s ⁴⁴	Jamiatul Ulama, Wifaq al-'Ulamā' UK	Umm al-Qurā calendar vs moonsighting	Groups aligned with Saudi calendar vs local moonsighting	Rejection of astronomical data by some; disputes over reliability of foreign sighting reports	Persistent divergence despite national conferences (1984–2006)

The evidence presented in this study demonstrates that false positive lunar crescent sightings are fundamentally a manifestation of human error, arising from the inherent limitations of human perception and judgement in observational practices. When such erroneous reports are accepted as valid, they create inconsistencies in the authentication process among religious authorities, leading to disunity in evaluative judgement. This lack of consensus in accepting or rejecting reported sightings has repeatedly resulted in divergent determinations of the new Hijri month, as evidenced in multiple countries across different periods.

These divergences undermine the goal of achieving religious and social cohesion at the national level, often resulting in the absence of a unified commencement of major Islamic observances within a single country. Consequently, reliance on unauthenticated or weakly verified human testimony alone is insufficient to ensure consistency and reliability in Hijri month determination. This reality highlights the urgent need for more robust, transparent, and systematic authentication mechanisms, integrating stringent testimonial verification with scientifically grounded astronomical validation tools, to minimise human error and to support more unified and credible decisions in new Hijri month determination.

Culture and Governance Aspect in New Hijri Month Determination

Determination of the new Hijri month falls under the authority of the administration as it involves calendrical planning, Ramaḍān, Shawwāl & Dhū al-Ḥijjah are regarded as the most important month by Muslims requiring preparation planning month in advance as human resources management and raw material such meat and poultry organization is required.

⁴³ Abdus Sattar Ghazali, "Islamic New Year 1437 Continues the Lunar Calendar Controversy."

⁴⁴ Yusuf Danka, "The History of the UK Following the Saudi Arabia Moonsighting Decision."

Although advance planning is essential for major Islamic observances such as Ramaḍān, Shawwāl, and Dhū al-Hijjah, the process of Hijri calendar determination itself does not inherently accommodate planning considerations. Instead, decisions regarding the commencement of these months are often made reactively, based on last-minute reports of lunar crescent sightings.

Furthermore, the determination of the new Hijri month is strongly influenced by socio-cultural background, educational orientation, historical experience, and religious preference. In such contexts, one segment of the community may accept a falsely reported lunar crescent sighting and consequently commence the new Hijri month on the following day, while another segment may reject the same report and observe the completion of thirty days before beginning the new month. These divergent responses frequently generate contestation between groups and, in some cases, escalate into social rifts and political tension, thereby undermining communal cohesion.

These happened to Indonesia's two major Islamic organizations, Nahdlatul Ulama and Muhammadiyah. Nahdlatul Ulama adapted lunar crescent sightings to determine the new Hijri month, while Muhammadiyah employed astronomical calculations for the new Hijri month determination⁴⁵. Susiknan contends that the determination of the new Hijri month is the cause of the separation between Nahdlatul Ulama and Muhammadiyah.⁴⁶ The separation sparks into a severe conflict when there is a case where the lunar crescent is reported sighted by Nahdlatul Ulama but rejected by Muhammadiyah, and conversely, there are also cases where the lunar crescent is reported sighted by Muhammadiyah but rejected by Nahdlatul Ulama. This conflict divides Muslim communities in Indonesia in the past. However, the issue has calmed down in recent years.

The same conflict was also found in South Africa and Nigeria with the same premise. Nigeria in 2014,⁴⁷ Jama'atu Nasril Islam (JNI), an Islamic Organisation headed by Sultan Sokoto, announced the commencement of Eid al-Adha on 23 September 2015. The announcement is based on the lunar crescent observation on 13 September 2015 and the commencement of Dhū al-Hijjah on 14 September 2015. The announcement was rejected by NMSC as the actual date of Eid al-Adha would be 24 September 2015, as the moon was not sighted on 13 September 2015. Consequently, Eid al-Adha is celebrated on two dates in Nigeria that year.⁴⁸

South Africa also records a colourful history of new Hijri month determination disagreement. Most of the disagreement is due to the clash between Deobandi, a group of scholars that originated from educational institutions established at Deoband, and Barelwi, a traditionalist group from Bareilly in Uttar Pradesh. Deobandi would not accept lunar crescent observation from Barelwi. Similarly, Barelwi rejected any lunar crescent observation report from Deobandi. This resulted in the clash in the new Hijri month determination date. Examples are Eid al-Fitri 1986, Ramaḍān 1988, and most recently Eid al-Fitri 2014. To navigate this issue, the United Ulama Council of South Africa (UUCSA) was formed to settle the disagreement between Deobandi and Barelwi. The clash of new Hijri month determination was slowly diminished since 2014, as both Islamic group is represented by UUCSA.⁴⁹ This issues are also prevalent to other countries as portrayed in Table 4.

⁴⁵ Raisal, "Berbagai Konsep Hilal Di Indonesia [Various Hilal Concepts in Indonesia]."

⁴⁶ Azhari, *Kalendar Islam : Ke Arah Integrasi Muhammadiyah-NU [Islamic Calendar: Towards Muhammadiyah-NU Integration]*.

⁴⁷ Lugga, *Moon Sighting Controversies*.

⁴⁸ Hassan-Bello, "Sharia and Moon Sighting and Calculation Examining Moon Sighting Controversy in Nigeria."

⁴⁹ Vahed and Waetjen, "Moon Sightings and the Quest for Muslim Solidarities in Twentieth Century Natal."

The findings of this section demonstrate that the determination of the new Hijri month is not merely a technical or jurisprudential process but is deeply shaped by cultural context, socio-cultural background, educational orientation, historical experience, and religious preference. These factors give rise to differing philosophical positions regarding the legitimacy of observational reports and the appropriateness of methodological approaches, whether based on naked-eye sighting, testimonial verification, or astronomical calculation. As a consequence, Muslim communities often exhibit selection bias in accepting or rejecting new moon reports, favouring evidence that aligns with their established doctrinal, cultural, or institutional affiliations. Such methodological and philosophical divergences have repeatedly resulted in conflicting determinations of the Hijri month, leading to discrepancies in the dates of major Islamic observances within the same country. These divisions not only undermine calendrical coherence but also generate social tension, weaken communal unity, and complicate governance and advance planning for religious, economic, and administrative activities. The comparative cases presented across different regions further illustrate that, in the absence of a unifying framework, diversity in authority and methodology tends to perpetuate fragmentation rather than constructive pluralism.

Table 4 : Cultural & Governance Divergence and Impact on Approaches in Hijri Month Determination Across Selected Regions

Country / Region / Source	Main Islamic Bodies / Communities	Method Adopted	Nature of Disagreement	Key Causes of Divergence	Outcome / Current Status
Australia (Ahmed, Ozalp, and Sertkaya 2023)	Moonsighting Australia; ANIC; AFIC; Lakemba Mosque	Mixed: moonsighting and calculation	Eid declared on different dates in 2023	Different calculation criteria; migration-driven diversity	Community confusion; highlights need for unified framework
Thailand (Sulaiman and Hassan 2018).	Office of the Syaikhul Islam; Presasasti; traditional Islamic schools (pondok)	Moonsighting supported by calculation	Minimal disagreement	Strong centralized leadership; shared educational tradition	High level of unity; <5% deviation from national decision
Papua New Guinea ⁵⁰	Kokoda Muslim Tribe; local village imams	Traditional indigenous methods	No major institutional conflict	Indigenous knowledge; spiritual guidance; lack of standardization	Localized, culturally rooted determination practices

Therefore, the establishment of a centralised national authority or an independent mediating body is essential to ensure consistency, credibility, and unity in Hijri month determination at the country level. Such an institution should integrate jurisprudential principles with scientifically robust authentication mechanisms, provide transparent decision-making processes, and command broad

⁵⁰ Sudirman Sudirman et al., “Accommodation of Customs and Islamic Laws in Determining the Beginning of the Month of Ramadan for Indigenous Papuan Muslim Community in West Papua,” *Jurnal Ilmiah Al-Syir’ah* 20, no. 2 (2022), <https://doi.org/10.30984/jis.v20i2.2038>.

communal legitimacy. By doing so, it can mitigate selection bias, reduce disputes over lunar crescent reports, and foster greater unity in the observance of the Hijri calendar within a single national context.

Geographical Aspect in New Hijri Month Determination

Adapting lunar crescent sighting for the new Hijri month determination requires a cloudless sky throughout the year and a twilight sky not stained by light pollution. Lunar crescent sighting is easily visible in a location with a cloudless sky, while in a location with a frequent overcast sky, the frequency of lunar crescent visibility is drastically lower. Likewise, a lunar crescent is easily detected in locations with low levels of light pollution, while in locations with high levels of light pollution, a lunar crescent sighting is less frequently visible.⁵¹ These issues provide insight into why location is necessary for adapting lunar crescent sightings for new Hijri month determination.

Brunei employs lunar crescent sighting in determining their new Hijri month for Ramaḍān, Shawwāl & Dhū al-Ḥijjah. The adaptation of lunar crescent observation gives slight uncertainty in planning and managing resources, vacations, and events during Ramaḍān, Shawwāl & Dhū al-Ḥijjah. However, Brunei is capable of doing so due to Brunei's relatively compact land size. The furthest road distance in Brunei is 120 kilometres which takes around two hours. In addition, Brunei's population is smaller compared to other countries, with 427 000 inhabitants, and 97% of the population is the situation in the western part of Brunei.⁵² This enables Brunei administrators to govern and manage Ramaḍān, Shawwāl & Dhū al-Ḥijjah celebrations while having the element of new Hijri month date uncertainty in their planning.

Indonesia and Malaysia, on the other hand, are separated by sea, which requires air travel. Their land sizes are massive, and the most extended road distances are 748 km and 1316 km for Malaysia and Indonesia, respectively. This requires at least 12 hours of car ride, not counting traffic jams, accidents, and disasters. Malaysia and Indonesia's populations are evenly separated throughout their country, with a concentration on the state capital Kuala Lumpur and Jakarta. Indonesia and Malaysia do not employ lunar crescent sightings to determine their new Hijri month. However, if they do, it causes intricacies and problems in handling the uncertainty of lunar crescent sightings. Human resource planning, raw material supply, and event management will be chaotic to ensure the provision of millions of inhabitants that populated a vast land. This indicates the problem caused by the adaption of lunar crescent sighting or *rupiah al-hilāl* from an administrative perspective.

To add to this point, Malaysia is an example of a location that has a yearly overcast sky. Its high humidity and cloud density account for Malaysia's position in the equatorial line and in the middle of the monsoon transition. A study shows that Malaysia has a 14% and 60% frequency of overcast and intermediate overcast-blue sky yearly. It also found Malaysia's average Okta Scale of 6.8 over 8, with a 0 Okta Scale to be clear and an 8 Okta Scale to be an Overcast sky.⁵³ A frequent overcast sky will result in unsuccessful lunar crescent observation consecutively.

⁵¹ Muhamad Syazwan Faid et al., "The Risk of Light Pollution on Sustainability," *ASM Science Journal*, 2019.

⁵² "Brunei Population," Worldometer, 2020, <https://www.worldometers.info/world-population/brunei-darussalam-population/>.

⁵³ A. Zain-Ahmed et al., "The Availability of Daylight from Tropical Skies—a Case Study of Malaysia," *Renewable Energy* 25 (2002): 21–30.

A Hijri month is rounded off to the 30th day for unsuccessful lunar crescent visibility. A consecutive 30th Hijri month will have probability visibility of a lunar crescent on the 28th and 27th day of a Hijri month. Research conducted by Schaefer found that the lunar crescent has a probability of visibility on the 28th or 27th day of the month if the previous four months are completed to the 30th repeatedly.⁵⁴ Using records of lunar crescent sightings in Indonesia, the probability of a 28th or 27th-day lunar crescent sighting rises if the 30th month is done successively. A visible 28th or 27th-day lunar crescent cause confusion and chaos among Muslims, particularly during Fasting month. This demonstrates that the location plays a primary consideration in adapting lunar crescent observation for new Hijri month determination.

A successful lunar crescent sighting requires a dark sky. The dark sky is required to ensure that the contrast between the moon and the sky is high enough to be visible to the human eye. The sky hampered by light pollution has reduced moon-sky contrast, lowering the chance of lunar crescent visibility. Thus, a lunar crescent observation requires sites free from light pollution.⁵⁵ In a country where urbanization is not expanded throughout its land, it is feasible to find a light pollution-free lunar crescent observation site; however, for a country where urbanization is expanded throughout its land, finding a suitable lunar crescent observation site is difficult. This is the case for Singapore. Singapore has explored all its landmasses, leaving no location suitable for observation free from light pollution. Therefore, Singapore cannot practice lunar crescent sighting and adopts the lunar crescent visibility criterion in determining the new Hijri month ⁵⁶. Location climates and level of light pollution need to be considered in adapting lunar crescent sightings for Hijri month determination. The location with the yearly overcast sky and high levels of light pollution contributes to the successive failure of lunar crescent visibility. This will lead to the probable sighting of a lunar crescent during the 28th and 27th day of the month, which consequently result in confusion among Muslims.

The geographical dimension emerges as a decisive factor in determining the suitability and reliability of Hijri month determination methods. The findings demonstrate that no single method can be universally applied without due consideration of a country's geographical strengths, weaknesses, limitations, and administrative capacities. Climatic conditions such as persistent cloud cover, high humidity, and monsoonal patterns, as well as environmental factors such as light pollution and urbanisation, directly affect the feasibility and accuracy of lunar crescent sighting (*ru'yah al-hilāl*). Advocating the exclusive use of lunar crescent sighting without accounting for these geographical constraint risks producing inaccurate or inconsistent Hijri month determinations.

From an Islamic jurisprudential perspective, this conclusion aligns with established *qawā'id fiqhiyyah*. The maxim *al-ḥukm yadūru ma'a 'illatihi wujūdān wa 'adaman* (a ruling revolves around its effective cause, existing when it exists and ceasing when it ceases) implies that when the effective cause for reliable sighting, namely clear skies and adequate visibility, is absent, strict reliance on *ru'yah* becomes juristically problematic. Similarly, the principle *lā ḍarar wa lā ḍirār* (no harm shall be inflicted or reciprocated) supports the avoidance of methods that repeatedly generate confusion, hardship, and communal discord due to predictable observational failure. In this context, insisting on lunar crescent sighting in regions characterised by perennial overcast skies and severe light pollution may constitute avoidable harm to public religious order (*niẓām*

⁵⁴ Bradley Schaefer, "The Length of the Lunar Month," in *Archaeoastronomy, JHA*, vol. 17, 1992.

⁵⁵ Nur Nafhatun Md Shariff et al., "The Impact of Light Pollution on Islamic New Moon (Hilal) Observation," *International Journal of Sustainable Lighting* 19, no. 1 (2017): 10–14, <https://doi.org/10.26607/ijsl.v19i1.61>.

⁵⁶ Nawawi, "Penilaian Semula Kriteria Kenampakan Anak Bulan Di Malaysia, Indonesia Dan Brunei."

al-‘ibādah). Moreover, empirical findings such as those by Schaefer reinforce this jurisprudential reasoning.⁵⁷ Repeated failure to observe the lunar crescent due to geographical constraints leads to successive completion of months to thirty days, thereby increasing the statistical probability of crescent visibility on the 27th or 28th day of the following month. Such anomalous early visibility, particularly during Ramaḍān, has historically caused widespread confusion and public unrest, undermining confidence in religious authorities and fragmenting communal observance.

Accordingly, Hijri month determination methodologies must be context-sensitive, integrating Islamic legal principles with geographical realities and administrative feasibility. Countries with compact territories, low light pollution, and favourable climatic conditions may reasonably accommodate lunar crescent sighting, while those with vast landmasses, dense urbanisation, persistent cloud cover, or high light pollution require alternative juristically valid approaches such as visibility criteria or calculation-based frameworks. Recognising geography as a legitimate determining factor is therefore not a departure from Islamic jurisprudence, but rather an application of its foundational principles to ensure accuracy, consistency, and unity in the observance of the Hijri calendar.

Limitation, Recommendation, and Conclusion

The Muslim community is immensely heterogeneous. Their religious practices, customs, and civilizations are dissimilar. The start of the significant Hijri month in the Islamic calendar is determined in part by this pattern. This research examines the main causes of these variations, including the political structures, physical locations, and social dynamics of various nations. By analyzing these factors, the research provides insightful viewpoints for managers and academics involved in managing or maybe coordinating the Hijri calendar in different countries or regions.

These challenges complicate any attempt to establish a globally standardized Hijri calendar. Regional cultural differences, varying political and religious authorities, and differing interpretations of Islamic law present major obstacles. Although the idea of a shared calendar for all Muslims could foster unity, the reality is that given the current heterogeneity of practices, this endeavour is difficult to accomplish. For a few groups, including government officials, religious leaders, astronomers, and Islamic scholars, this study has significant ramifications. Government officials may use this research to create policies that are more inclusive of and respectful toward diverse cultural practices. Astronomers can more effectively determine the start of the next Hijri month by combining scientific methods with guidance from foundational Islamic texts. Islamic scholars who advise communities can engage in deeper discussions on how to determine the Hijri month in ways that incorporate contemporary methods while still adhering to Islamic teachings. In conclusion, this research demonstrates the difficulties involved in determining the Hijri month across the Muslim world, and it offers insightful analysis for key stakeholders.

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⁵⁷ Schaefer, “The Length of the Lunar Month.”

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