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Representation of Muhammadiyah's Hisab Method in TVMU's Da'wah Media: Systematic Literature Review

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ABSTRACT

Determining the beginning of the hijri month, which marks the beginning of religious observances such as the Ramadan fast and the Hajj, should ideally be carried out simultaneously in Indonesia. Differences in methods among Islamic organizations, such as Muhammadiyah and Nahdlatul Ulama, often lead to differences in timing. This study aims to examine the development of literature on Muhammadiyah's hisab method and the contribution of Islamic media to shaping public understanding of the determination of the Hijri month's beginning. The study used the Systematic Literature Review (SLR) method, following PRISMA guidelines, to include articles published between 2010 and 2025. The results show that Muhammadiyah's hisab method has evolved from a theological approach to a scientific paradigm grounded in modern astronomy, based on the principle of hisab benarki wujudul hilal (accurate crescent moon sighting). Studies of Islamic media, particularly television, show limited research specifically discussing the representation of the hisab method in religious broadcasts. The media has great potential to disseminate science-based religious literacy and strengthen public understanding of the rationality of hisab as a method for determining the Islamic calendar. This study emphasizes the importance of integrating science, religion, and Islamic media in strengthening religious awareness in the modern era.

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1. INTRODUCTION

Indonesia is the world's largest archipelagic nation. Its diversity is seen as natural and can even be a blessing, reflecting the richness of cultures, ethnicities, and beliefs that coexist within one country [1]. NU determines the beginning of the hijri month through the religious obligation of crescent moon sighting, based on the decisions of its National Conferences and Congresses from 1954 to 2021 [2]. In 1994, PBNU adopted the MABIMS guidelines, which use a minimum moon height of 2° and an age of at least 8 hours to determine the lunar month

[3]. After 1998, NU combined hisab with rukyat, maintaining the latter as a traditional, eyewitness-based method despite regional variations [4].

Muhammadiyah determines the beginning of the Hijri month solely by hisab, without requiring the visibility of the crescent moon [5]. The development of hisab science by K.H. Ahmad Dahlan and Jamil Djambek led Muhammadiyah to adopt the wujudul hilal theory in 1938, after having used hisab hakiki since 1911 [6]. Muhammadiyah adopted a new approach, using the crescent moon sighting as an integral part of the criteria for the beginning of the lunar month. This decision is an effort to create balance and moderation between the imkanur rukyat method and the ijtimak qabla al-ghurub method [7]. Muhammadiyah continuously reviewed its theory through several forums—such as the 1970 Hisab Falak Seminar (Yogyakarta), the 25th Tarjih Conference (2000, Jakarta), the 2002 National Workshop (Yogyakarta), and the 26th Tarjih Conference (2003, Padang)—all reaffirming the continued relevance of the Wujudul Hilal theory [8]. Rukyat is in accordance with the Prophet's (peace be upon him) command to perform rukyat and the prohibition against fasting during Ramadan and Eid al-Fitr before performing rukyat. He said:

صُوْمُوْا لِرُؤْيَتِهِ وَأَفْطِرُوْا لِرُؤْيَتِهِ، فَإِنْ غُبِّيَ عَلَيْكُمْ فَأَكْمِلُوْا عِدَّةَ شَعْبَانَ ثَلَاثِيْنَ (رواه البخارى والفظ له ومسلم)

"Fast when you see the new moon and celebrate Eid al-Fitr when you see the new moon; if clouds obscure the moon, then complete the month of Sha'ban by thirty days." (Narrated by al-Bukhari, and the above pronunciation is his pronunciation, and is also narrated by Muslim).

NU bases the hijri month on rukyat to deepen faith and awareness of God's greatness [9]. Rukyat observes the crescent moon, while hisab calculates its movement using astronomical methods [10]. Hisab consists of two types: urfi, based on the moon's average motion, and hakiki, based on its actual position with specific criteria [11]. Muhammadiyah begins the lunar month if, on the 29th day at sunset, the conjunction occurs before sunset and the moon is above the horizon [12]. Imkanur Rukyat MABIMS is the official reference for the government in determining the start of the hijri month [13]. based on guidance from Surah Yasin (36): 39–40.

وَالْقَمَرَ قَدَّرْنٰهُ مَنَازِلَ حَتّٰى عَادَ كَالْعُرْجُوْنِ الْقَدِيْمِ ﴿٣٩﴾ لَا الشَّمْسُ يَنْۢبَغِيْ لَهَآ اَنْ تُدْرِكَ الْقَمَرَ وَلَا الَّيْلُ سَابِقُ النَّهَارِۗ وَكُلٌّ فِيْ فَلَكٍ يَّسْبَحُوْنَ ﴿٤٠﴾

"And we have appointed manzilah-manzilah for the month, so that (after he reaches the last manzilah) he returns as the form of an old bunch. The sun can't get the moon, and the night cannot precede the day. Each circulates in its orbit" (QS. Yasin (36).

The government's Imkanur Rukyat criteria, established in 1978 and revised by MABIMS in 1990, specify the minimum moon height, angular distance, and age after ijtimak, using both hisab and rukyat [14]. The 2016 MABIMS meeting established new criteria for moon height and elongation, enabling the simultaneous determination of Ramadan and Eid based on both hisab and rukyat [15]. In 2021, MABIMS established crescent moon criteria at a 3° altitude and 6.4° elongation, which were adopted in Indonesia starting in 2022 [16]. According to Badan Hisab dan Rukyat, Almanak Hisab Rukyat [17], Differences in determining the dates of 1 Shawwal and 10 Zulhijah in Indonesia often threaten Muslim unity and can sometimes lead to conflict.

Since the 1950s, the Ministry of Religious Affairs has held isbat sessions to determine the dates of Ramadan, Shawwal, and Zulhijjah, which are widely anticipated by the public [18]. The Ministry of Religious Affairs established the Hisab and Rukyat Agency (BHR) in 1972, led by Muhammadiyah astronomer Sa'adoeddin Djambek, involving experts from various institutions [15]. In Indonesia, the lunar month begins according to rukyat and hisab, but differences between these methods persist [19]. Since the establishment of LFNU in 1984, at least four differences have occurred between NU and the government. For example, in 1992, NU set Eid al-Fitr on April 4, while the government and Muhammadiyah set it on April 5 [20]. In 1993, NU observed Eid al-Fitr on March 24, while the government followed it on March 25. In 1994, NU celebrated it on March 13, while the government observed it on March 14 [21].

In 2000, NU celebrated Eid al-Adha on March 17, while the government set it on March 16, showing continued differences despite both leaders being from NU [22]. In 1998, Muhammadiyah celebrated Eid al-Fitr on January 29, while the government and NU set it for January 30, following updated calculations based on the rukyat [23]. In 2001, Muhammadiyah began fasting on November 16, while the government and NU set it for November 17, based on hisab al-imkanur-rukyat [24]. After the Reformation, differences over Eid al-Fitr persisted, with Muhammadiyah and Persis setting it on December 5, 2002, while the government and NU set it on December 6 [25].

Differences in Eid al-Fitr dates between Muhammadiyah, NU, and the government occurred in 2006, 2007, and 2011, with Muhammadiyah celebrating one day earlier each time [26]. Most Muslims still prefer rukyat over hisab, whose use is limited due to traditional scholarly views [27]. In 2012, Muhammadiyah set the Ramadan calendar based on astronomical calculations without participating in the government's isbat session [28]. The 1998 determination on 1 Shawwal reflected government dominance and religious politicization, as valid rukyat reports were not found to meet the official imkan al-rukyat criteria [29].

Various studies have examined the determination of the beginning of the hijri month [30]. The first Tarawih at At-Tanwir Mosque marks the start of Ramadan and Muhammadiyah’s spiritual unity, as shown in Figure 6.

Figure 1. Photo of At-Tanwir Mosque. b. Screenshot of YouTube TVMU, live first tarawih prayer of 1446 H.

As part of a literature analysis on Muhammadiyah's hisab method, Table 1 presents the differences in determining the beginning of the hijri month in Indonesia. The initial data were adapted from Jayusman [14], which covers the period up to 2001 (Ramadan), 2011

(Shawwal), and 2010 (Dzulhijjah). The author then updated the data up to 2025. Table 9 highlights Muhammadiyah's independent hisab hakiki wujudul hilal and its counter-hegemonic stance against government isbat sessions via TVMU.

Table 1**.** Differences in Determining the Beginning of the Hijri Month in Indonesia in 1988 AD – 2025 AD

No.	Determining the Beginning of the Month	Year
1.	Ramadan	1989 AD, 2001 AD, 2012 AD, 2013 AD, 2014 AD, 2018 AD, 2022 AD, 2024 AD.
2.	Shawwal	1992 AD, 1993 AD, 1994 AD, 1998 AD, 2002 AD, 2006 AD, 2007 AD, 2011 AD.
3.	Dzulhijjah	1989 AD, 2000 AD, 2003 AD, 2010 AD, 2013 AD, 2014 AD, 2015 AD, 2022 AD, 2023 AD.

This study examines communication issues surrounding Muhammadiyah's independent determination of the hijri month, which is announced via TVMU rather than the government's isbat session, highlighting a research gap on how Muhammadiyah's hisab is conveyed through this media. Most studies focus only on hisab and rukyat from the perspectives of fiqh (Islamic jurisprudence) and astronomy [31], [32], [33], not on their ideological and media communication aspects. Therefore, this study aims to synthesize previous studies to explain how Muhammadiyah's counter-hegemony, through the hisab method, operates on TVMU.

2. METHOD

This paper uses the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology [34] to review the literature on the representation of Muhammadiyah's hisab method for determining the beginning of the hijri month on Muhammadiyah TV (TVMU). PRISMA was chosen for its structured, systematic approach, which enables it to identify, evaluate, and synthesize scientific evidence in a transparent and replicable manner. The PRISMA methodology consists of four main stages: 1. Identifying research questions (RQ), 2. Identifying article sources, 3, selecting articles based on inclusion and exclusion criteria, and four, analyzing results, and synthesizing findings.

Identifying Research Questions (RQ)

This systematic review formulates several key questions to gain a deeper understanding of how the Muhammadiyah hisab method is represented through Islamic propagation media:

(RQ1): How has the literature on the Muhammadiyah hisab method developed in the context of determining the beginning of the Hijri month during the 2010–2025 period?

(RQ2): How does television media represent the Muhammadiyah hisab method in Islamic propagation content and religious broadcasts?

(RQ3): What are the trends in the themes and methodologies of academic research examining TVMU content related to the Muhammadiyah hisab method?

(RQ4): How does the literature describe the contribution of Islamic propagation media to public understanding of the Muhammadiyah hisab method?

Collection of Relevant Articles

The literature search encompassed publications from 2010 to 2025, sourced from databases such as Scopus, Web of Science, Sinta, and reputable local journals, utilizing keywords including "Muhammadiyah Accounting," "Hijri Month Determination," "Muhammadiyah TV," "Dakwah Media," and "Islamic Broadcasting." Only full-text works in Indonesian or English directly discussing hisab methods, digital da'wah, or Islamic media representation were included.

Inclusion and Exclusion Criteria

The inclusion criteria required articles to be from reputable journals (Scopus, Web of Science, national peer-reviewed journals indexed by Sinta, or reputable local journals), published between 2010 and 2025, explicitly discussing the calculation method, the determination of the beginning of the hijri month, debates on Islamic astronomy, or Islamic da'wah media (TVMU), and written in English or Indonesian. Excluded were non-scientific articles such as magazines, blogs, popular opinion pieces, non-indexed proceedings, or unpublished academic works without repositories; publications without full-text access; articles that only briefly mentioned concepts without in-depth analysis; and duplicate articles from different databases.

Table 3. Research Inclusion and Exclusion Criteria

Aspect	Inclusion Criteria	Exclusion Criteria
Publication Type	Reputable journal articles (Scopus, Web of Science, or national peer-reviewed journals indexed by Sinta, or reputable local journals).	Non-scientific articles (magazines, blogs, popular opinion pieces, non-indexed proceedings).
Publication Year	2010–2025	< 2010
Language	English & Indonesian	Other languages for which no official translation or abstract is available.
Main Topics	Discussion of the calculation method for determining the beginning of the Hijri month, and the debate over Islamic astronomy or Islamic da'wah media (TVMU).	Articles that only mention terms without in-depth analysis.
Study Type	Empirical study (qualitative, quantitative, mixed-method), review, conceptual framework, media analysis.	Short editorial, unverified field notes, unpublished technical report.
Accessibility	Full-text is available through academic databases (Scopus, WoS, ERIC, Google Scholar, Sinta), and theses and dissertations, which are fully accessible through official university repositories (institutional repositories).	Articles, theses, or dissertations that are not available in full text or only in abstract form; documents without academic credibility (e.g., blogs, popular magazines, or personal notes).
Relevance to RQ	Articles that explicitly answer at least one of RQ1–RQ4	Articles that are not related to Muhammadiyah's accounting or the role of media for da'wah.

Selection Based on Research Questions

The selection process consisted of three stages: title–abstract screening for relevance, removal of duplicates and non-academic works, and thematic evaluation to ensure alignment with RQ1–RQ3. Of the 135 articles, 28 met the initial criteria, and 15 were ultimately selected for analysis using the PRISMA method.

The selection process followed the PRISMA method, beginning with the identification of 210 articles from various databases, including 180 from Scopus and Web of Science, and 30 from other sources such as Google Scholar and Sinta. During the screening process, approximately 40 duplicates were removed, and 170 articles were evaluated based on their titles and abstracts, leaving 87 for full-text assessment. In the eligibility stage, these 87 articles were reviewed in full; however, 83 were excluded because they did not address the research questions, lacked full text, or were only briefly mentioned. Finally, 30 core articles relevant to at least one of RQ1–RQ4 were included for in-depth analysis.

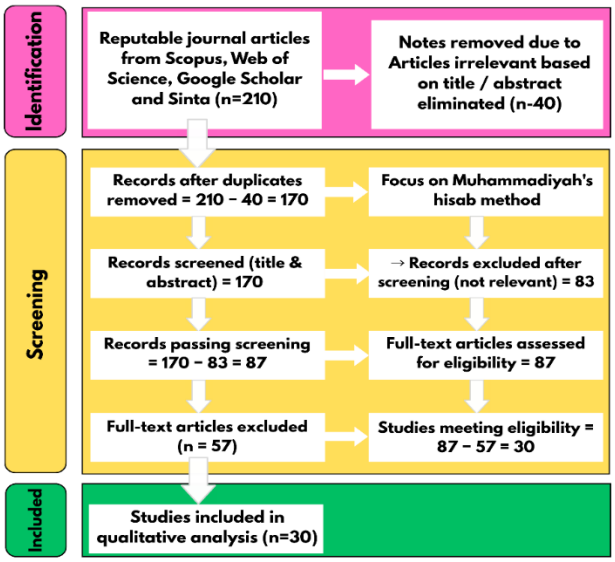


Figure 2. Study flow diagram illustrating the selection process of articles related to Muhammadiyah's *hisab* method and its representation in Islamic media.

Analysis of Selected Articles

Literature shows Muhammadiyah's consistent use of hisab as a symbol of rational, modern Islam, with TVMU promoting public understanding through educational and participatory da'wah as a counter-hegemonic medium to rukyat. Table 3. Analysis of Selected Papers.

Table 4. Selected Papers

No	Author and Year	Title	Journal/Publisher	Country
1	[35]	Methods in Determining New Hijri Month: a Thematic Review from an Islamic Jurisprudence Perspective	*Malaysian Journal of Syariah and Law*	Malaysia
2	[36]	When Astronomy Meets AI: Manazel For Crescent Visibility Prediction in Morocco	*arXiv preprint*	France
3	[37]	Organizational Communication Strategy in Reporting Ramadan Coverage (Jelang Berbuka) and Breaking News of the Sidang Isbat For 1 Syawal 1446 H	*Syiar: Jurnal Komunikasi dan Penyiaran Islam*	Indonesia
4	[38]	Reforming the Islamic Calendar and Religious Authority: Dynamics of Hijri Calendar Calculation in Indonesia within Persatuan Islam's Thought	*Al-Manāhij: Jurnal Kajian Hukum Islam*	Indonesia
5	[39]	Analysis of determining the beginning of the lunar month in indonesia: a comparative study of the rukyah and hisab methods	*Al-Wadh'iyyah: Journal of Sharia Law and Legal Studies*	Indonesia
6	[40]	An Examination of The Practical Implementation of The Neo Mabims Criteria in the Determination of the New Islamic Month in Indonesia	*JSEAIS: Journal of Southeast Asian Islam and Society*	Indonesia
7	[41]	State Authority and Religious Contestation: Resistance to Governmental Decisions on Islamic Calendar Determination in Indonesia	Fikri : Jurnal Kajian Agama, Sosial dan Budaya	Indonesia
8	[42]	Hijri Month Determination in Southeast Asia: An Illustration Between Religion, Science, and Cultural Background	*Heliyon*	United Kingdom
9	[43]	Ḥusn al-Jawāb 'an Ithbāt al-Ahillah bi al-Ḥisāb: Basyūnī 'Imrān's Method for Standardising the Determination of the Qamariyah Month in the Sultanate of Sambas (1913-1976)	*Journal of Islamic Law*	Indonesia
10	[44]	Predicting new crescent moon visibility by applying machine learning algorithms	*Scientific Reports*	United Kingdom
11	[45]	The Fiqh of Hisab-Ru'ya in the Twentieth Century Indonesia: A Study on the Thoughts of Hamka, Hasbi Ash-Shiddieqy, and Moenawar Chalil about the Unification of Hijri Calendar	*Al-Manahij: Jurnal Kajian Hukum Islam*	Indonesia
12	[46]	Hijriyah Months and The Construction of Religious Moderation in The Sombaopu Community of Gowa, South Sulawesi	*Al-'Adalah*	Indonesia
13	[47]	Determination of Islamic Month Start by Moonsighting Australia (Case Study: 1 Dzulhijah 1441)	*Journal of Islamic Thought and Civilization*	Pakistan
14	[48]	A Pattern-Recognizer Artificial Neural Network for the Prediction of New Crescent Visibility in Iraq	*Computation*	Switzerland

No	Author and Year	Title	Journal/Publisher	Country
15	[49]	Visualization and Legalization of K.H. Ahmad Dahlan's Hisab Method in Tafsir al-Azhar by Hamka	*Al-Qisthu: Jurnal Kajian Ilmu-Ilmu Hukum*	Indonesia
16	[50]	A radio determination of the time of the New Moon	*Monthly Notices of the Royal Astronomical Society*	Arab Saudi
17	[51]	On the origins of the hijri calendar: A multi-faceted perspective based on the covenants of the prophet and specific date verification	*Religions*	Switzerland
18	[52]	Shahadah 'Ilmy; Integrating Fiqh and Astronomy Paradigm in Determining The Arrival of Lunar Months in Indonesia	*Al-Ihkam: Jurnal Hukum dan Pranata Sosial*	Indonesia
19	[53]	Unification of global hijri calendar in Indonesia: An effort to preserve the maqasid sunnah of the prophet (saw)	*Journal of Islamic Thought and Civilization*	Pakistan
20	[54]	Global Islamic Calendar Digital Information Mapping	*Al-Marshad: Jurnal Astronomi Islam dan Ilmu-Ilmu Berkaitan*	Indonesia
21	[55]	The Beginning of Islamic Months Determination in Indonesia and Malaysia: Procedure and Social Condition	*Ulul Albab*	Indonesia
22	[56]	New approach on study of new young crescent (Hilal) visibility and new month of Hijri calendar	*Journal of Physics: Conference Series*	United Kingdom
23	[57]	Analysis of observations of earliest visibility of the lunar crescent	*Observatory*	Arab Saudi
24	[58]	Al-Syatibi Methodology Analysis In The Unification Of Usul Al-Fiqh Methods	*International Journal of Academic Research in Business and Social Sciences*	Malaysia
25	[59]	Suggestion of a conventional Islamic calendar	*NRIAG Journal of Astronomy and Geophysics*	Mesir
26	[60]	Unified Islamic Calender in the Perspektive of Islamic Legal Philosophy	*Al-Jāmi'ah: Journal of Islamic Studies*	Indonesia
27	[61]	The relevance of using the moon's age as an alternative in imkanur rukyah criteria	*International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives*	Malaysia
28	[62]	Basis for Using the Rukyah Method for Determining the Arrival of Ramadan and Syawal in Brunei Darussalam	*Journal of Islamic Studies and Culture*	USA
29	[63]	A Unified Islamic Calendar Proposal for the World	*Middle-East Journal of Scientific Research*	Maroko
30	[64]	Moonset Lag With Arc of Light Predicts Crescent Visibility	*MNASSA : Monthly Notes of the Astronomical Society of South Africa*	USA

Data Extraction and Synthesis

Each article in terms of author, year, country, objectives, methods, contribution to RQ1–RQ4, and relevance to the development of Islamic da'wah media and hisab practices at TVMU. Data to explore links between the Hisab method, TVMU representation, research themes, methods, and media contributions, as shown in Table 4.

Table 5. Data Extraction and Synthesis

No	Author and Year	Main Focus	RQ1 (hisab literature)	RQ2 (Television media representation)	RQ3 (TVMU method)	RQ4 (Media contribution)
1	[35]	Thematic review of hisab-rukyat	✓	–	–	–
2	[36]	The combination of astronomical data and machine learning improves the accuracy of crescent moon visibility in Morocco to 98.8%.	✓	–	–	–
3	[37]	Television communication strategy	–	✓	–	✓
4	[38]	Reform of the Islamic calendar authority	✓	–	–	–
5	[39]	Comparison of hisab and rukyat	✓	–	–	–
6	[40]	Evaluation of Neo-MABIMS implementation	✓	–	–	–
7	[41]	Resistance of society and state authority in determining 1 Syawal: a historical social analysis of the hisab rukyat method	✓	–	–	✓
8	[43]	The calculation method and standardization of determining the lunar month in the Sambas Sultanate	✓	–	–	–
9	[42]	Uniformity of regional Islamic calendar	✓	–	–	–
10	[44]	Application of machine learning to predict the visibility of the new moon	✓	–	–	–
11	[45]	The development of hisab-rukyat fiqh in Indonesia; the position of Muhammadiyah and NU	✓	–	–	–
12	[46]	Hisab, rukyat, moderation	✓	–	–	✓
13	[47]	Islamic media authority	–	–	–	✓
14	[48]	Modern AI-based calculation technology	✓	–	–	–
15	[49]	Legalization of Ahmad Dahlan's calculations	✓	–	–	–
16	[50]	Radio-based crescent moon detection	✓	–	–	–
17	[51]	The origins of the Hijri calendar	✓	–	–	–
18	[52]	Integration of fiqh and astronomy	✓	–	–	–
19	[53]	Efforts to unify the Hijri calendar based on maqasid and the hisab method	✓	–	–	–
20	[54]	Digital calendar mapping	✓	–	–	✓
21	[55]	Aspects of jurisprudence and astronomy	✓	–	–	–

No	Author and Year	Main Focus	RQ1 (hisab literature)	RQ2 (Television media representation)	RQ3 (TVMU method)	RQ4 (Media contribution)
22	[56]	Scientific criteria for crescent visibility	✅	–	–	–
23	[57]	Astronomical model for crescent visibility in determining the beginning of the Hijri month	✅	–	–	–
24	[58]	Unification of law based on maqasid	✅	–	–	–
25	[59]	The hisab/tabular method can enrich historical mapping	✅	–	–	–
26	[60]	Unification of the global Islamic calendar	✅	–	–	–
27	[61]	Evaluation of the criteria for imkanur rukyat	✅	–	–	–
28	[62]	The basis of rukyat in Brunei compared to MABIMS hisab-rukyat	✅	–	–	–
29	[63]	Proposed global Islamic calendar based on visibility of the crescent moon and the International Date Line	✅	–	–	–
30	[64]	Scientific criteria for crescent sightings	✅	–	–	–

The contribution matrix shows that most studies focus on RQ1 (hisab literature), with limited attention to RQ4 (media), few to RQ2 (TV representation), and none to RQ3 (TVMU method).

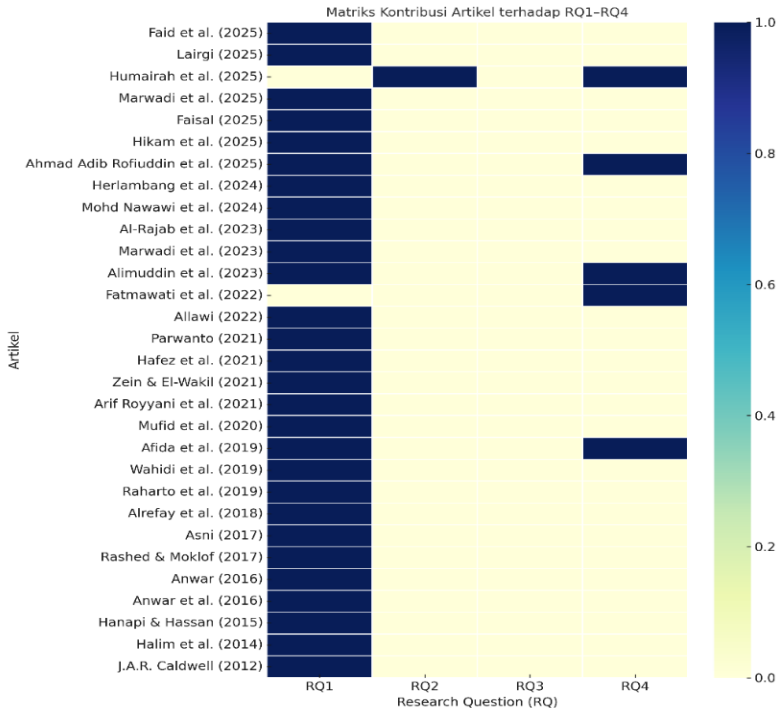


Figure 3. The results of the article contribution

The following are the results of the article contribution analysis in the form of a bar chart in Figure 3.

- **RQ1** (Hisab Literature) → 28 articles (93.3%)
- **RQ2** (Television Media Representation) → 1 article (3.3%)
- **RQ3** (TVMU Method) → 0 articles (0%)
- **RQ4** (Media Contribution) → 6 articles (20%)

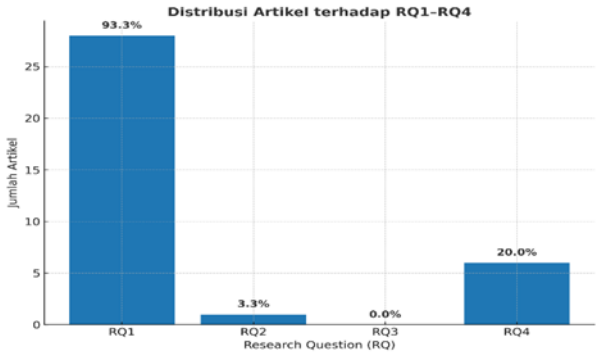
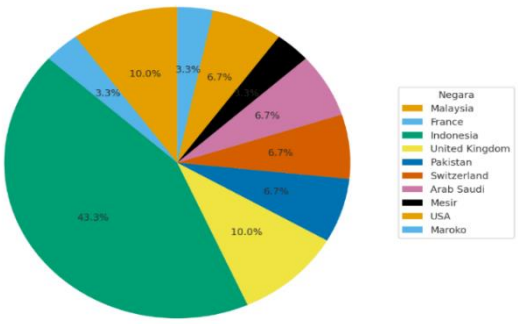


Figure 4. Distribution Article

The analysis reveals that most articles originate from Indonesia, followed by Malaysia, Saudi Arabia, and the UK, with contributions from other countries being minimal, as illustrated in Figure 4 and Table 5.

a. Figure 5. Distribution Article Area



b. Table 6. Data

Country	Amount	Presentation
Indonesia	14	46.7%
Malaysia	3	10.0%
United Kingdom	3	10.0%
Pakistan	2	6.7%
Switzerland	2	6.7%
Arab Saudi	2	6.7%
USA	2	6.7%
France	1	3.3%
Mesir	1	3.3%
Marocco	1	3.3%

The analysis reveals a dominant focus on RQ1, which concerns theological and astronomical studies of Muhammadiyah's hisab method, while contributions to RQ2–RQ4 remain limited to media and communication issues. This research gap highlights the need to expand the study to encompass aspects of da'wah and media, as illustrated in Figure 6.

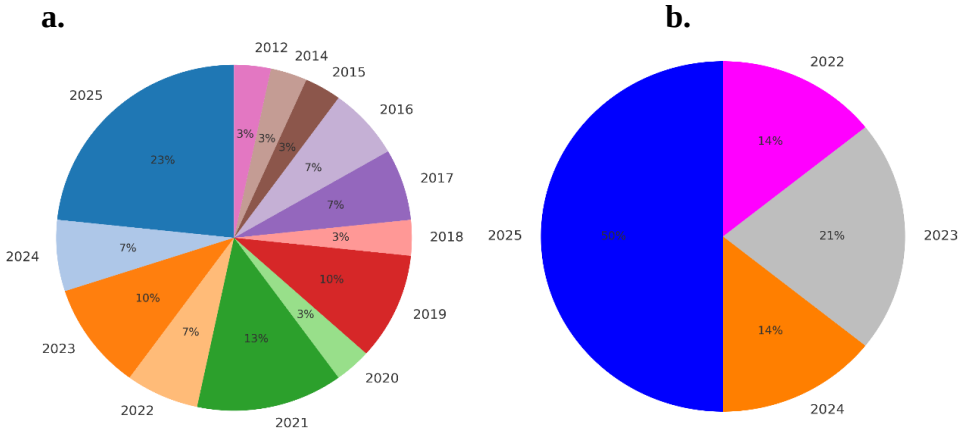


Figure 6. Descriptive Statistical Analysis of Literature Collections Based on (a) Year of Publication (2010–2025), (b) Thematic Categorization of Studies.

3. RESULTS AND DISCUSSION

3.1 Result

RQ1: Muhammadiyah Hisab Literature

Indonesia's Islamic calendar reform highlights Muhammadiyah's promotion of hisab hakiki wujudul hilal as a scientific, modern method, contrasting with traditional rukyat and influencing national calendar unification discourse [38]. Hikam et al. [40] highlight the renewal of the national hisab system through the Neo-MABIMS criteria, which emphasize a shift from traditional rukyat to scientific hisab grounded in religious consensus. Literature on Muhammadiyah's hisab method emphasizes rationalization and modernization in determining the hijri month [60]. Emphasizes unifying the global Islamic calendar using fiqh and astronomical approaches, with the imkanur rukyat criteria, for a scientific, universal calendar [39], [55].

Meanwhile, Royyani et al. [52] introduced the concept of Shahadah' Ilmi to integrate astronomical evidence with fiqh legitimacy, thereby strengthening the position of scientific hisab in the Islamic calendar system. Parwanto [49] demonstrated the ideological and historical dimensions of the Muhammadiyah hisab method through Hamka's interpretation of K.H. Ahmad Dahlan's thoughts, who emphasized the legalization and visualization of the hisab method as part of modern Islamic renewal. Furthermore, Afida et al. [54] mapping and digitizing astronomical data support global Islamic calendar unification and modernize Muhammadiyah's hisab as a scientifically verifiable method.

Rukyat in Brunei provides sharia legitimacy for Ramadan and Shawwal, but varying criteria across countries hinder the creation of a unified Islamic calendar [64]. Through research on moonset lag and the arc of light, scientific criteria for the visibility of the crescent moon are developed, which strengthen the empirical approach to determining the beginning of the hijri month. Nawawi [42] determined the hijri month in Southeast Asia to vary between the traditional rukyat and scientific hisab approaches [36]. Integrates artificial intelligence (AI Manāzil system) to predict the visibility of the crescent moon automatically [65]. Highlights the importance of astronomical calculations in Islamic jurisprudence, asserting that scientific calculations can serve as a legal basis for determining the beginning

of the hijri month. [60] Using the moon's age as an astronomical method reflects a global shift toward scientific hisab, aligning with Muhammadiyah's rational approach in Indonesia.

The transition from a pre-Islamic lunisolar to a purely lunar calendar was a key milestone in the development of the Islamic hisab system [51]. Meanwhile, Asni [58] examines Al-Syatibi's methodology in the effort to unify the Islamic calendar, emphasizing the importance of scientific consistency and religious authority in the application of the hisab method. Archaeoastronomical research suggests that the pre-Islamic Arabic calendar was likely a lunisolar system, shedding light on the historical roots of Islamic astronomy and the hijri calendar [44]. [48]. An AI neural network model in Iraq demonstrates how modern technology can enhance the accuracy of the Hijri calendar method [59]. A conventional Islamic calendar based on global astronomical calculations was proposed to reduce differences between Muslim countries [63], and it strengthened the scientific side by formulating a visual contrast threshold for astronomical observations, which is relevant for objectively calculating the probability of crescent visibility—the following Table 5 presents the findings.

Table 7. RQ1 – Muhammadiyah hisab literature in the context of determining the beginning of the hijri month

RQ1 – Main Study Focus	Author(s)
Conceptualization and Islamic jurisprudence-astronomical basis for determining the hijri month	[55], [60], [65]
Development of the hisab method and rationalization of the existence of the crescent moon	[38], [39], [49]
Integration of Islamic jurisprudence and astronomy in a scientific approach	[52], [53], [56], [57], [58]
Digitalization, technology, and innovation in the modern hisab system	[36], [48], [54]
Updating the national and regional crescent moon determination system (Neo-MABIMS)	[35], [40], [41], [43], [46], [50]
Empirical and astronomical studies of crescent moon visibility	[61], [63], [64]
History and archaeoastronomy of the pre-Islamic Arabic calendar	[44], [51]
Unification and reform of the global Islamic calendar	[42], [59], [62]

Literature on hisab exhibits a shift from traditional rukyat to a scientific approach that combines fiqh and astronomy, with Muhammadiyah as a consistent proponent. In contrast, global research emphasizes technological innovation, religious reform, and the unification of the Islamic calendar.

RQ2: Representation of Hisab in Television Media

Findings from the literature indicate that discussions of the representation of the hisab method in television media remain minimal. However, several studies focusing on broadcast communication and religious coverage provide essential context for understanding how Islamic astronomical practices, including hisab and rukyat, are communicated to the public. For example, research by Humairah et al. [37] examined the communication strategies of television media organizations in reporting on Ramadan and the isbat (confirmation) session for the determination of 1 Shawwal 1446 AH. This study demonstrated that television media played a significant role in shaping the public discourse on Islamic astronomy (hisab-rukyat) by incorporating both religious and national values. The broadcasts not only conveyed the

results of the new moon determination but also established an image of spiritual authority and the credibility of the scientific sources used in the coverage.

This finding is relevant to the context of Muhammadiyah and TVMU, where television media serves as a modern means of preaching to emphasize the rationality of the accurate hisab method for determining the crescent moon's existence. Although there is little literature directly examining TVMU content, studies such as Humairah [37] and other research on religious communication demonstrate the significant potential of television media to strengthen public understanding of the hisab method and the Islamic calendar.

Table 8. RQ2 – Representation of hisab in television media and religious broadcasts

RQ2 – Main Study Focus	Author(s)
Television communication strategies in coverage of Ramadan and the Isbat Session as a form of religious preaching	[37]

Humairah's [37] research is the only study to date to highlight the role of television in religious broadcasting. Their findings indicate that television serves as a means of public outreach, framing Islamic astronomical issues, such as the determination of the hijri months, through a communication strategy that balances scientific and religious aspects.

RQ3: Academic Research Themes and Methodology on TVMU Content

The results of the literature analysis indicate that, during the 2010–2025 study period, no academic research has been found specifically examining the content of Muhammadiyah TV (TVMU) broadcasts regarding the representation of hisab, or Islamic astronomy-based da'wah methods. Most relevant studies discuss hisab and rukyat methods only from the perspectives of Islamic jurisprudence, astronomy, or religious authority, without addressing communication, media, or television. Meanwhile, research on religious communication, such as that of Humairah [37], discusses television media but does not specifically examine TVMU.

In terms of methodology, studies on Islamic da'wah media still employ descriptive qualitative approaches, such as interviews, observations, and case studies, and have not yet developed media analysis or digital strategies grounded in broadcast content. Therefore, no empirical data describes how TVMU presents Muhammadiyah's hisab method in its da'wah programs. This lack of research is a significant finding, indicating a research gap in Islamic media studies, particularly in integrating Muhammadiyah's hisab method with television da'wah communication.

Table 9. RQ3 – Themes and Methodology of Academic Research on TVMU Content

RQ3 – Main Study Focus	Author(s)
No research has been found specifically discussing TVMu and the Hisab method	- (Synthesized findings from the Systematic Literature Review analysis)

No research has examined TVMU's content or Muhammadiyah's hisab representation on television; existing studies discuss hisab and da'wah separately, leaving a research gap and opportunities to examine Muhammadiyah's scientific da'wah media.

RQ4: Contribution of Islamic Propagation Media

The literature review shows that the role of Islamic propagation media in building public understanding of the hisab and rukyat methods has begun to receive attention in several studies, although the number remains limited. Three studies relate to this theme, both directly and conceptually. Research by Fatmawati [66] highlights television as a platform for da'wah (Islamic outreach), serving to convey religious values through coverage of Ramadan and isbat (Islamic confirmation) sessions. Television as a means of disseminating Islamic astronomical information and strengthening public understanding of the process of determining the beginning of the Hijri month. These findings demonstrate the relationship between arithmetic, religious authority, and public communication.

Furthermore, research by Farid et al. [35] on Muhammadiyah uses modern da'wah media, such as TVMU, to assert religious independence and legitimize its hisab method against state authority. Meanwhile, Afida et al. [54] highlighted how Muhammadiyah's publication of hisab through the media and its internal calendar system served as a form of resistance to the government's rukyat system. This study demonstrates that the media is not merely a means of communication but also an ideological instrument for broadening the public's understanding of the scientific methods used to determine the Islamic calendar. Da'wah media are key in spreading scientific religious knowledge, but their impact on public perception of Muhammadiyah's hisab method remains underexplored.

Table 10. RQ4 – Contribution of Islamic media to public understanding of muhammadiyah's hisab method

RQ4 – Main Study Focus	Author(s)
Television as a space for Islamic da'wah and dissemination of Islamic astronomy information (Ramadan & Isbat Sessions)	[37]
Muhammadiyah's counter-hegemony through Islamic da'wah media and TVMU in determining the beginning of the hijri month	[66]
Muhammadiyah's publication of Islamic media as a form of resistance to the government's rule authority	[54]

Three studies of Humairah et al. [37], Afida et al. [54], and Fatmawati et al. [66] demonstrate that da'wah media plays a significant role in shaping the public's understanding of the hisab and rukyat methods. Media serves as a space for communication, education, and religious legitimacy; however, no research has specifically examined the media's direct impact on the public's understanding of Muhammadiyah's hisab methods.

3.2 Discussion

Directions and Trends in Muhammadiyah Calculation Research (2010–2025)

The study results indicate that the literature on Muhammadiyah's calculation methods has experienced significant development in the past two decades. Most research focuses on aspects of astronomy, Islamic jurisprudence, and the Islamic calendar system in the context of determining the beginning of the hijri month. Studies such as those by Faisal [39] and Hikam et al. [40] highlight efforts to unify the Islamic calendar and strengthen the scientific

legitimacy of the calculation method by introducing new criteria, such as Neo-MABIMS. Muhammadiyah's approach, which emphasizes astronomical rationality and accuracy, is seen as a manifestation of epistemological modernization in understanding worship times.

The circular regression model confirms that Muhammadiyah's hisab method is scientifically grounded and aligns with modern astronomical approaches to determining the hijri month [67]. The comparison highlights Muhammadiyah's consistent use of the scientific hisab hakiki wujudul hilal, in contrast to NU's empirical rukyat approach [68]. Although hisab is increasingly accepted scientifically, research still focuses on theological aspects and overlooks its social and public communication roles, highlighting tensions between religious and state authorities [69]. Thus, research trends in RQ1 demonstrate that while scholarly focus on the technical aspects of hisab has grown strongly, studies on the public communication dimension, the socialization of the hisab method, and its acceptance in society remain relatively limited.

The Role of Television Media in Representing Muhammadiyah's Hisab Method

Efforts to harmonize the Islamic calendar through a thematic interpretation approach demonstrate that the integration of hisab and rukyat has a theological basis in the Qur'an and can serve as a foundation for global unification of the hijri calendar. This study emphasizes the significance of the interplay among interpretation, astronomical science, and religious authorities in shaping an inclusive modern hisab system [70]. Based on the literature analyzed, most studies discuss the role of official state institutions such as the Indonesian Ulema Council (MUI), the Ministry of Religious Affairs, and the Hisab and Rukyat Agency (BHR) in maintaining the unity of the Muslim community through the isbat (confirmation) meeting mechanism [69], [71], [72]. The isbat meeting is a responsibility of the ulil amri (leaders of authority) to provide certainty regarding religious law [73]. Formally, Indonesia has been using Neo-MABIMS since 2022; however, its practical implementation still faces technical, jurisprudential, and social obstacles, so it is not yet running consistently in accordance with astronomical criteria [74].

However, several studies highlight the emergence of dynamics and resistance to state authority, particularly from Muhammadiyah, which rejects the subordination of hisab (calculation) to isbat (conclusion) decisions and develops an independent model based on astronomical rationality [14], [75], [76]. This resistance is through Islamic preaching channels such as TVMU, which asserts epistemic independence in determining the beginning of the hijri month. Furthermore, several studies reveal the plurality of rukyat and hisab practices at the local level [77], [78], as well as debates regarding the implementation of the new MABIMS criteria [79]. These findings collectively emphasize that determining the beginning of the hijri month is not a purely technical astronomical issue but also a matter of authority, legitimacy, and religious representation in the public sphere. In Indonesia, public law and isbat sessions communicate religious policy, while organizations like Muhammadiyah independently broadcast their hisab calculations through religious media [80].

Research Trends on TVMU and Muhammadiyah's Hisab

Studies such as [81] demonstrate that the research methodology for determining the beginning of the hijri month on a normative-fiqh approach positions hisab as a legal and worship issue rather than as public communication discourse or media representation. Demonstrates a gap between research based on religious texts and interdisciplinary approaches that link hisab to modern media and da'wah. The integration of contemporary science with sharia rukyat confirms that hisab and scientific observation represent a form of harmonization between science and religion in determining the beginning of the hijri month [82]. The debate over deciding the start of the month (hisab-rukyat) is not only a religious and political issue, but also a topic that arises in the public sphere, including through media such as TVMU, which participates in discussing and disseminating an understanding of Muhammadiyah's hisab method [83].

The research methodology for the Islamic calendar has begun to shift from a textual legal approach to one grounded in Maqasid Syariah, which emphasizes public interest and scientific rationality. This shift demonstrates a new trend in academic literature to integrate Sharia values with scientific and social analysis. Although studies explicitly linking this approach to media representation, particularly religious television, are still very limited [84]. Studies on hisab and the Islamic calendar have shifted toward empirical and integrative analysis by applying MABIMS criteria. This approach marks a shift from normative fiqh studies to research based on astronomical data and regional policies, reflecting scientific trends in modern literature. However, such research has not yet been widely linked to the context of public communication or da'wah media, thus opening up opportunities for further research on the dimensions of media representation [85].

Contribution of Islamic Propagation Media to Public Understanding

The Triple Helix approach emphasizes the importance of collaboration among the government, academics, and Islamic organizations in fostering a unified public understanding of the hijri calendar [86]. The integration of sharia and astronomical approaches in determining the beginning of the hijri month demonstrates that astronomy-based public education plays a crucial role in building religious awareness. Scientific literacy in an Islamic context serves as a communication bridge between religious authorities and the public, a role ideally assumed by Islamic propagation media in the contemporary context [87].

Public religious literacy needs to be through da'wah media that emphasizes the integration of astronomy and sharia. Thus, [88], religious media bridges the gap between 'hisab' and 'rukyat' knowledge, promoting scientific understanding and public literacy as a key strategy in contemporary da'wah [89]. During the reign of Caliph Umar, the hijri calendar was established to organize Muslim life, strengthen community identity, and mark significant worship times and Islamic history [90]. Islamic propagation media are not limited to television or electronic broadcasts; they also include forms of religious literacy that communicate astronomical knowledge to the public. Thus, Azis et al. [91] broaden the understanding that Islamic propagation media, in any form, play a vital role in building

public awareness of the rationality of the hisab method and in reducing conflicts of knowledge in religious practice.

Muhammadiyah boycotted Ministry of Isbat sessions under Suryadharma Ali due to politicization but resumed participation under Minister Lukman Hakim (2014–2019) [92]. Differences in determining the start dates of Ramadan and Eid follow three paradigms: rukyah alone (NU, Brunei), hisab alone (Muhammadiyah, Persis, Singapore), and a combination of both (Malaysia, MUI, Indonesian Ministry of Religious Affairs) [93]. The publicly announced start of Ramadan and holidays can influence social identity and encourage the actions of religious adherents in social life [94]. A PRISMA-based literature review reveals that most studies focus on scientific and fiqh analyses of hisab and rukyat, particularly in Southeast Asia. In contrast, the role of TVMU and other da'wah media in representing Muhammadiyah's hisab remains unexplored, highlighting a research gap that future studies can address.

4. CONCLUSION

This study demonstrates that Muhammadiyah's hisab method has evolved from a theological debate into a scientific approach grounded in modern astronomy, serving not only to determine prayer times but also to reinforce religious rationalization, scientific authority, and Islamic identity, with a focus on certainty and community welfare. Despite ongoing efforts to unify the Hijri calendar, discrepancies in criteria and authority persist, necessitating collaboration among religious institutions, academics, and the state. Additionally, the role of television as a medium for Islamic propagation, particularly in its representation of Muhammadiyah's hisab, remains underexplored. However, it holds strategic potential to enhance public understanding of hisab-rukyat issues through scientific, educational, and inclusive communication, highlighting the need for further research on the media's role in fostering Islamic astronomical literacy and community awareness.

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