

INTEGRATION OF ḤISĀB AND RUKYAT IN DETERMINING THE BEGINNING OF THE LUNAR MONTH: UNITY OF SCIENCE PERSPECTIVE

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Abstrak:

Penelitian ini bertujuan untuk menganalisis integrasi metode ḥisāb dan rukyat dalam penentuan awal bulan Hijriah melalui perspektif unity of science. Metodologi yang digunakan adalah metode kualitatif dengan pendekatan deskriptif-analitis. Data dikumpulkan melalui studi literatur dan analisis dokumen-dokumen terkait, termasuk fatwa dan pedoman penentuan awal bulan dari lembaga keagamaan. Penelitian ini fokus pada identifikasi titik temu antara ḥisāb dan rukyat, serta eksplorasi bagaimana keduanya dapat saling melengkapi dalam konteks ilmiah dan religius. Temuan utama menunjukkan bahwa integrasi ḥisāb dan rukyat sejalan dengan prinsip unity of science, memungkinkan sinergi antara ilmu agama dan sains. Analisis data yang menghubungkan teori astronomi dengan perspektif syariah menghasilkan model integratif untuk penentuan awal bulan Hijriah. Model ini memanfaatkan akurasi perhitungan ḥisāb dan validasi empiris rukyat, meningkatkan presisi penentuan awal bulan dan mengurangi perbedaan pendapat di kalangan umat Islam. Penelitian ini juga mengungkapkan potensi penggunaan teknologi modern dalam rukyat untuk menjembatani kesenjangan dengan ḥisāb. Kesimpulannya, pendekatan integratif ini menawarkan solusi komprehensif yang menghormati tradisi fikih sambil memanfaatkan kemajuan astronomi.

Kata kunci: Integrasi, Ḥisāb, Rukyat, Unity of Science

Abstract:

This study aims to analyze the integration of ḥisāb and rukyat methods in determining the beginning of the Hijri month through the perspective of unity of science. The methodology used is a qualitative method with a descriptive-analytical approach. Data were collected through literature studies and analysis of relevant documents, including fatwas and guidelines for determining the beginning of the month from religious institutions. The research focuses on identifying the common ground between ḥisāb and rukyat, as well as exploring how they can complement each other in scientific and religious contexts. The main findings show that the integration of ḥisāb and rukyat is in line with the principle of unity of science, allowing synergy between religion and science. Data analysis linking astronomical theory with sharia perspectives resulted in an integrative model for the determination of the beginning of the Hijri month. This model utilizes the accuracy of ḥisāb calculations and empirical validation of rukyat, increasing the precision of the determination of the beginning of the month and reducing differences of opinion among Muslims. The research also reveals the potential of using modern technology in rukyat to bridge the gap with ḥisāb. In conclusion, this integrative approach offers a comprehensive solution that respects fiqh traditions while utilizing astronomical advances.

Keywords: Integration, Ḥisāb, Rukyat, Unity of Science

A. INTRODUCTION

Islamic science should be built on the foundation of theological thinking based on the unity of science, where science develops from two main sources, namely ayat al-Mathluwah (the Qur'an) and ayat al-Majluwah (the universe). These two verses are the interrelated words of God and become an unlimited source of knowledge. Without this approach, the unity of the paradigm of science in Islam will not be achieved, and the dichotomy between religious science based on the Qur'an and al-Sunnah and general science based on the results of intellectual empirical work through observation, research and experimentation on the phenomena of the universe will continue.¹

The determination of the beginning of the month in the Hijri calendar is a crucial issue that has long been a source of debate among Muslims. The two main methods used in this determination are *ḥisāb* (astronomical calculation) and *rukyat* (astronomical calculation).² and *rukyat* (direct observation of the hilal).³ Differences in the use of this method often result in non-uniformity in the determination of the beginning of the Hijri month, especially for important months such as Ramadan, Shawwal, and Dhulhijjah, which has direct implications for the implementation of Muslim worship.

The dichotomy between *ḥisāb* and *rukyat* has created polarization among Muslim scholars and communities. Supporters of *rukyat* argue that this method is more in line with the sunnah of the Prophet Muhammad and the practices of the early generations of Islam. On the other hand, *ḥisāb* proponents emphasize the accuracy of modern astronomical calculations and their ability to predict the visibility of the hilal well in advance, which is considered more practical in the context of modern society.

The *ijtihadiyya* nature of *ḥisāb* and *rukyat* allows for a diversity of views. Both *ḥisāb* and *rukyat* have the potential to be right or wrong, even though the objects of *ḥisāb* and *rukyat*, namely the moon and the sun, are one. The natural law that governs their movements is also the same, namely *sunnatullah*. However, the interpretation of the results of *ḥisāb* can vary, and the differences in location and the limitations of observation in *rukyat* cannot be equalized, resulting in differences in results.⁴

Developments in science and technology have brought a new dimension to this discussion. Advances in astronomy and observation technology have improved the accuracy of both calculations and hilal observations. However, instead of bridging the differences, these developments have often reinforced the existing dichotomy.

¹ Mirza Mahbub Wijaya, *Filsafat Kesatuan Ilmu Pengetahuan*, Cet. I (Semarang: Fatawa Publishing, 2019), 80–81.

² A. Jusran Kasim et al., "Determination of Hijri Calendar in Islamic History and Its Criteria in Southeast Asia," *Journal of Al-Tamaddun* 19, no. 1 (2024): 249, <https://doi.org/10.22452/JAT.vol19no1.18>.

³ Ahmad Zuhdi Muhdlor dan Atabik Ali, *Kamus Kontemporer Arab-Indonesia* (Yogyakarta: Yayasan Ali Maksum Ponpes Kranyak, 2006), 30.

⁴Initially, scholars only debated the differences between *ḥisāb* and *rukyat*. Now, even the same *ḥisāb* method is contested. The debate is about which *ḥisāb* criteria should be used. In Indonesia, there are at least two *ḥisāb* criteria adopted. Muhammadiyah uses the wujudul hilal criterion, which considers the beginning of the new month to occur when the moon is above the horizon at sunset. Meanwhile, the Indonesian Ministry of Religious Affairs uses the imkanur ru'yat criterion, which is based on the possibility of the moon being visible. See: Thomas Djamaluddin, *Menggagas Fiqh Astronomi*, ed. Cet. I (Bandung: Kaki Langit, 2005), 41.

B. RESEARCH METHODS

This research uses a qualitative method with a descriptive-analytical approach.⁵ to explore the integration between *hisāb* and *rukyat* in determining the beginning of the Hijri month through the Unity of Science framework.⁶ Data were collected through literature studies, analysis of relevant documents, such as fatwas and guidelines for determining the beginning of the month from religious institutions. This research aims to identify the meeting point between *hisāb* and *rukyat*, and how they can complement each other in a scientific and religious context. Data analysis is conducted by linking astronomical theory with sharia perspectives, to produce an integrative model that can be implemented in the determination of the Hijri calendar.

C. RESULTS AND DISCUSSION

1. Legal Basis for the Beginning of the Hijri Month

The legal basis of *hisāb*⁷ and *rukyat* comes from the Qur'an and Hadith, which are the main guidelines for Muslims in determining times of worship, especially the beginning of the lunar month. In the Qur'an, Allah SWT says in Surah Al-Baqarah verse 189,

يَسْأَلُونَكَ عَنِ الْاَهْلِ قُلْ هِيَ مَوَاقِيْتُ لِلنَّاسِ وَالْحَجِّ

Meaning: "They ask you about the crescent moon. Say: 'The crescent is a sign of time for mankind and (for the pilgrimage).'"

The mention of *hilar* in the plural "*ahillah*" indicates that such moon sightings occur repeatedly in one cycle of its movement. Wahbah al-Zuhaylî defines *hilar* as the moon that appears very thin on the first two or three nights at the beginning of the month, and a similar appearance will be repeated at the end of the month.⁸ *Hilar* is understood as the visible moon with a light shape resembling an old bunch or sickle, so it is often called the crescent moon. This *hilar* appearance refers to the phenomenon of observation (*rukyat*), although by *hisab*, the phases or *manzilah* of the moon, including the *hilar* phase, can be calculated. This definition of *hilar* emphasizes the importance of visual observation in determining the beginning of the month.⁹

Meanwhile, a hadith narrated by Bukhari mentions the words of the Prophet Muhammad SAW ,

⁵ John W. Creswell, *Research Design Pendekatan Metode Kualitatif, Kuantitatif dan Campuran*, 4 ed. (Yogyakarta: Pustaka Pelajar, 2021), 23.

⁶ According to Muhyar Fanani, Unity of Sciences is to incorporate the substantive values of Islam into scientific buildings at the level of epistemology, ontology, and axiology. Muhyar Fanani, Karnadi dan Sholihan, *Laporan Penelitian Kolektif: Transformasi Paradigma dan Implikasinya pada Desain Kurikulum Sains* (Semarang: LPM IAIN Walisongo, 2014), 3.

⁷ In language, the term *hisāb* means count, calculation, arithmetic, reckoning, calculus, computation, estimation, calculation, appraisal. Whereas in terms, *hisāb* refers to the calculation of the positions of celestial bodies to determine their positions at a certain desired time. Ridwan, *Kontestasi Mazhab Hisab dan Rukyat di Indonesia*, ed. oleh Muhammad Fuad Zain, Cet. I (Yogyakarta: Pustaka Ilmu Yogyakarta, 2022), 79.

⁸ Wahbah bin Musthafâ Al-Zuhaylî, *al-Tafsir al-Munîr fî al- 'Aqidah wa al-Syarî'ah wa al-Manhaj*, vol. 2 (Damaskus: Dâr al-Fikr al- Mu'âsir, 1418), 169.

⁹ Thomas Djamaluddin, *Astronomi Memberi Solusi Penyatuan Ummat* (Jakarta: Lembaga Penerbangan dan Antariksa Nasional, 2011), 5.

حَدَّثَنَا آدَمُ حَدَّثَنَا شُعْبَةُ حَدَّثَنَا مُحَمَّدُ بْنُ زِيَادٍ قَالَ سَمِعْتُ أَبَا هُرَيْرَةَ رَضِيَ اللَّهُ عَنْهُ يَقُولُ قَالَ النَّبِيُّ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ أَوْ قَالَ قَالَ أَبُو الْقَاسِمِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ صُومُوا لِرُؤْيَيْهِ وَأَفْطِرُوا لِرُؤْيَيْهِ فَإِنْ غُيِّبَ عَلَيْكُمْ فَأَكْمِلُوا عِدَّةَ شَعْبَانَ ثَلَاثِينَ.

Meaning: [Adam] told us [Shu'bah] told us [Muhammad ibn Ziyad] said, I heard [Abu Hurairah (may Allah be pleased with him)] say: The Prophet (peace and blessings of Allah be upon him) said: "Fast on the sighting of the new moon and break the fast on the sighting of the new moon. If it is obscured by a cloud, then complete the month of Sha'ban by thirty days."¹⁰

This hadith explicitly states that the rukyat method is ta'abbudi gair al-ma'qul ma'na. This means that it cannot be rationalized. Consequently, the definition of rukyat is limited to observing the moon with the naked eye, with no room for expansion or development of meaning. Based on this understanding, the use of the hisāb method for determining the beginning of the month is absolutely unacceptable.¹¹ In contrast to the Hisab School, they view that the hadith about rukyat can be rationalized, so that its meaning can be expanded and developed. In this case, the word "rukkyat" can be interpreted as "knowing" the existence of the hilal, even if it is only based on strong conjecture (*zhanni*) and not direct vision, for example through astronomical calculations (*hisāb falaki*).¹²

2. The Controversy of Hisāb and Rukyat in Fiqh

قَوْلُهُ (فَرَعٌ) لَوْ شَهِدَ بِرُؤْيِيَةِ الْهِلَالِ وَاحِدٌ أَوْ اثْنَانِ وَافْتَضَى الْحِسَابُ عَدَمَ إِمْكَانِ رُؤْيَيْهِ، قَالَ السُّبْكِيُّ: لَا تُقْبَلُ هَذِهِ الشَّهَادَةُ، لِأَنَّ الْحِسَابَ قَطْعِيٌّ وَالشَّهَادَةُ ظَنِّيَّةٌ، وَالظَّنُّ لَا يُعَارِضُ الْقَطْعَ.

In determining the beginning of the Hijri month, Al-Subki argues that if there is a testimony of the sighting of the new moon, but the hisāb calculation shows that the new moon is unlikely to be seen, then the testimony cannot be accepted. This is because hisāb is considered certain (*qat'i*), while rukyat is conjectural (*zhanni*). In Islamic epistemology, what is certain cannot be defeated by what is conjectural. Therefore, hisāb is used to reject testimony, not to determine the appearance of the new moon.¹³

الْحِسَابُ حُجَّةٌ فِي النَّفْيِ لَا فِي الْإِثْبَاتِ.

Al-Subki's opinion confirms that if hisāb shows that the new moon is not likely to be sighted, then conflicting rukyat testimony cannot be accepted as a basis for determining the beginning of the month. However, hisāb cannot be used independently to determine the new moon, because the determination still requires direct sighting testimony. This approach combines hisāb and rukyat, where hisāb serves to reject impossible testimonies, but not as the main tool for determining the beginning of the Hijri month.

مَنْ صَامَ بِنُجُومٍ أَوْ حِسَابٍ لَمْ يُجْزِئْهُ وَإِنْ أَصَابَ، وَلَا يُحْكَمُ بِطُلُوعِ الْهِلَالِ بِهِمَا وَلَوْ كَثُرَتْ إِصَابَتُهُمَا.

Ibn Muflih emphasized that the determination of the beginning of the Hijri month, especially in relation to acts of worship such as fasting, should not be based on astronomical hisāb. Although hisāb or astrology can be accurate, he emphasized that direct sighting of the

¹⁰ Al-Bukhari, *Sahih al-Bukhari* (Beirut: Dar al-Kutub al-'Ilmiyyah, 2004), 33.

¹¹ Ahmad Izzuddin, *Ilmu Falak Praktis*, Cet. III (Semarang: PT. Pustaka Rizki Putra, 2012), 92.

¹² Ahmad Izzuddin, 2007, 44-45)

¹³ Abu Bakar Syatha, *I'alah at-Thalibin*, jilid II (Beirut: Dar al-Fikr, 1993), 243.

new moon remains the main requirement, according to Islamic tradition. *Ḥisāb* is only considered as a tool, not the main basis for determining *shar'i* law.¹⁴

Basically, rukyat¹⁵ Rukyat and *ḥisāb* are not contradictory as long as both are based on accurate data and facts. Rukyat, as a simple method that has been proven valid, was commanded by the Prophet Muhammad and practiced by the Companions and Muslims for centuries. This method remains relevant and can be used at any time. However, the development of Islamic civilization has made the practice of rukyat increasingly challenging in determining the beginning of the month. There are often claims of seeing the hilal, even though what is actually seen is not the hilal. Therefore, a more detailed record of the hilal and the rukyat process is needed.¹⁶

3. The Development of *Ḥisāb* and Rukyat Methods in the Modern Era

In determining the beginning of the Hijri month, objectivity is the main principle that must be prioritized over subjectivity. The *fiqhiyah* rule proposed by Muhammad Rashid Ridlā in *Tafsir al-Manār* and quoted by Wahbah al-Zuhayli states, “*الْعِلْمُ مُقَدَّمٌ عَلَى الظَّنِّ*” (Knowledge is preferred over prejudice).¹⁷ This emphasizes that if objective knowledge and data are available, decisions should be based on facts, not on estimates or prejudices. As in the example of Qibla direction, when one can see the Kaaba directly, there is no longer a need for *ijtihād* to determine its direction. Similarly, in the determination of the beginning of the lunar month, if there is a conflict between subjectivity and objectivity, then objectivity should take precedence in accordance with the rule, “*لَا عِبْرَةَ بِالظَّنِّ الْبَيْنِ خَطْؤُهُ*” (Something that is subjective and clearly wrong, it will be ruled out).¹⁸

In the modern era, the integration of *ḥisāb* (astronomical calculation) and rukyat (hilal observation) methods is a step forward in strengthening objectivity. In the past, rukyatulhilal testimony was only judged based on the credibility of the witness and his oath, which may have been sufficient in its day. However, with the development of technology such as telescopes and digital imagery, rukyat testimony can now be supported by more accurate scientific evidence, while still adhering to the principles of *fiqh* that prioritize knowledge over prejudice.

The use of instruments or software as a means of determining the beginning of the Hijri month is a response to the constraints of direct rukyat, such as bad weather or light pollution and limited observation locations. This technology allows accurate calculation of the position of the moon and the likelihood of hilal sighting without depending on visual observation. With constantly updated scientific data, astronomy software predicts the

¹⁴ Ibnu Muflih, *Al-Furu'*, IV (Baitul Afkar, n.d.), 22.

¹⁵ Rukyatulhilal is an Arabic term consisting of two words, “ruk yat” and “hilal,” which form a single unit of meaning. In Arabic, these are known as *mudhāf* and *mudhāf ilayh*. Ahmad Junaidi, “Memadukan Rukyatulhilal dengan Perkembangan Sains,” *Madania: Jurnal Kajian Keislaman* 22, no. 1 (2018): 26, <https://doi.org/10.29300/madania.v22i1.730>.

¹⁶ Astronomy, which is an access to the advancement of human civilization, is an undeniable fact, and has helped and facilitated the worship of Muslims. So that the order of the vast universe can be detected carefully by this science. In theory, astronomical *ḥisāb* is sufficient to determine the beginning of the new month. However, the texts of the Qur'an and as-Sunnah explicitly command to sight the new moon, not just count it. Arwin Juli Rakhmadi Butar-Butar, *Problematika Penentuan Awal Bulan Diskursus Antara Hisab dan Rukyat* (Malang: Madani (Kelompok Intrans Publishing), 2014), 75.

¹⁷ Zuhayli, *Al-Tafsir al-Munir Fī al-'Aqīdah Wa al-Syari'ah Wa al-Manhaj*, Jilid II (Damaskus: Dar al-Fikr, 1998), 148.

¹⁸ Ahmad bin Muhammad Al-Zarqa, *Syarhal-Qawaid al-Fiqhiyah*, Cet. 4 (Damaskus: Dār al-Qalam, 1996), 357.

position of the hilal with high precision, making it faster and easier to determine the beginning of the month, especially in difficult conditions. Instruments such as digital telescopes or specialized software can even “see” the hilal virtually, which can replace direct observation (Rukyatul hilal). However, the implementation of this technology still requires legitimacy from religious authorities to be legitimately recognized as a method of determining the beginning of the month.¹⁹

4. The dichotomy of ḥisāb and rukyat

The debate between proponents of ḥisāb and rukyat has been ongoing for centuries, creating complex discussions regarding the interpretation of hadith, the validity of the scientific method, and the flexibility of Islamic law in the face of changing times. This dichotomy²⁰ does not only touch on theological and fiqh aspects²¹, but also has social, political and even diplomatic implications in the global context of Muslims.

- a. Theological differences in interpretation of the sources of Islamic law (the Qur'an and Sunnah), especially regarding the hadith about “fasting on the sighting of the new moon and breaking the fast on the sighting of the new moon”, became one of the main triggers.²² Scientific treasures derived from religion, if understood textually, will often cause conflict with experimental science. In fact, both deserve to sit together to solve the problems of the people.²³
- b. Technical: The ḥisāb experts have different views regarding the groupings and criteria used by the rukyat experts, especially in terms of differences in mathla' and the use of tools in the rukyat method. This difference is caused by two main factors, namely the variety of ḥisāb systems and references used, as well as differences in guiding criteria that affect the results of hisab calculations. These differences are divided into two types, namely ḥisāb urfi and ḥisāb hakiki.²⁴
- c. The authority followed and political factors also play an important role in reinforcing the differences between these two methods. In many countries, the decision to determine the beginning of the Hijri month is made by official religious institutions or the government, which follow guidelines and criteria that they consider to be correct. In

¹⁹ According to Ibn Hajar al-Haytamî in *Tuhfah al-Muhtâj*, the use of rukyat aids such as mirrors that reflect objects is not permitted, although the reason is not explained. However, al-Syarwânî in *Hawâshî Tuhfah al-Minhâj* states that although it is preferable not to use aids, basically the use of tools that bring the object closer and enlarge it is still allowed. ‘Abd al-Hamîd al-Syarwânî, *Hawâsyî Tuhfah al-Muhtâj bi Syarh al-Minhâj* (Kairo: Mathba’ah Musthafâ Muhammad, n.d.), 372.

²⁰ The dichotomy of science is one of the problems that triggers anxiety among contemporary Muslim scientists. Groups of sciences such as Natural Sciences, Social Sciences, and Humanities are not well intertwined as interconnected entities. For example, academics in Natural Sciences often do not care or even recognize important issues that develop in Social Sciences, Humanities, and even more so Religious Studies. This phenomenon has led to intellectual fragmentation in the academic world, especially in the development of scientific methodologies, which also has a negative impact on the lives of society at large. Fuad, “Kebenaran Ilmiah Dalam Pemikiran Thomas S. Kuhn Dan Karl R. Popper: Suatu Kajian Hermeneutika dan Kontribusinya Bagi Masa Depan Ilmu,” *Jurnal Filsafat* Vol. 25 (2015): 270.

²¹ Susiknan Azhari, *Ilmu Falak Teori dan Praktik* (Yogyakarta: Suara Muhammadiyah, 2004), 92.

²² Muhamad Sirojutholibin, “Problematika penggunaan hisab rukyat dalam penetapan awal bulan Qamariah,” *Maliki Interdisciplinary Journal (MIJ)* 2, no. 3 (2024): 210, <https://urj.uin-malang.ac.id/index.php/mij/index>.

²³ M. Amin Abdullah, *Multidisiplin, Interdisiplin, & Transdisiplin: Metode Studi Agama & Studi Islam Di Era Kontemporer* (Yogyakarta: IB Pustaka, 2020), 6.

²⁴ & Muhammad Syamsu Alam Darajat. Isroqunnajah, M.Hadi Masruri, “Uji sahih observasi Hilal siang hari dengan Hisab Hakiki kontemporer sistem Ephemeris Al-Falakiyah,” *Al-Marshad: Jurnal Astronomi Islam dan Ilmu-ilmu Berkaitan* 2 (2022): 84, <https://doi.org/10.30596/jam.v8i2.10703>.

countries with large Muslim populations, sometimes these decisions are also influenced by political considerations, where the government may prefer one of the methods to maintain social stability or political legitimacy. As a result, the different authorities followed by the community lead to variations in the determination of the beginning of the Hijri month, even within a single country.

5. Nisbi and ultimate truth

Ḥisāb is a method of determining the beginning of the month based on accurate mathematical and astronomical calculations, but the results are still relative because they depend on the models and assumptions used. On the other hand, rukyat is a method of direct observation of the hilal which is also relative because it is influenced by external factors such as weather and atmospheric conditions. The relative truth in this context means that neither ḥisāb nor rukyat can provide absolute certainty in all places and times, due to geographical differences and natural conditions. While the ultimate truth is absolute and universal, it is difficult to achieve in determining the beginning of the Hijri month due to human limitations. The difference in results between ḥisāb and rukyat shows that both offer relative truth and can complement each other in finding the closest result to the truth.

In the expression of Al-Syathibi (1328-1388), the benchmark related to implications and consequences is termed the principle of “impact analysis” (i'tibar al-ma'al), namely the positive impact (mashlahah) and negative impact (mafsadah), of an object or action. Logically, no matter how strong the textual argument or the content of the benefit, if it can bring negative implications (mafsadah) socially, politically, economically, or culturally, then a certain opinion or action is not valid to be called “right”. Thus, both ḥisāb and rukyat methods need to be considered based on the impact they produce, not just based on textual truth alone.²⁵

6. The Meeting Point of Ḥisāb and Rukyat in the Framework of Unity of Science

Although astronomical calculations can be very accurate in predicting the position of the moon, ḥisāb results are only predictive. Ḥisāb cannot guarantee that the hilal will be visible to the naked eye, as atmospheric conditions, light pollution, or other factors can affect the visibility of the hilal. Therefore, rukyat serves as an empirical confirmation of the results of ḥisāb. On the other hand, rukyat also has limitations, especially regarding weather conditions or the technical capabilities of the observer. In this case, ḥisāb can provide guidance on the optimal time and place to perform rukyat, thus increasing the likelihood of successful hilal observation.

The common ground between ḥisāb and rukyat lies in their ability to complement each other. Ḥisāb provides accurate predictions of time and position, while rukyat provides empirical validation. When the results of ḥisāb and rukyat confirm each other, they provide stronger and more reliable results in determining the beginning of the month. In Unity of Science, the integration of ḥisāb and rukyat reflects the principle that science and religion should not operate in isolation. Both need to interact dynamically to achieve a deeper and holistic understanding of natural phenomena, including the timing of worship in Islam.

²⁵ Abu Ishaq Al-Syathibi, *Tahdziib Al Muwaafaqaat fii Ushuul Al Ahkaam*, ed. oleh Muhammad ibn Husayn Al Jayzaanii, Cet. I (Arab Saudi: Dar Ibn Al Jayzani, 2000), 342.

7. Unity of Science in the Integration of Ḥisāb and Rukyat

Unity of Sciences rejects the dichotomy between scientific and religious knowledge, as both are part of the process of understanding reality. Science is the result of human efforts in understanding objects, both physical and metaphysical. Physical objects can be understood through the senses and reason, while metaphysical objects are understood through divine illumination accessed through human spiritual intelligence.²⁶

a. Epistemological Aspects:

Epistemology is concerned with the theory of knowledge, how we acquire and validate knowledge.²⁷ In the context of the integration of ḥisāb and rukyat, epistemology looks at how these two methods function as legitimate sources of knowledge. Ḥisāb, which is based on mathematical and astronomical calculations, produces knowledge through a rational and predictive approach. Meanwhile, rukyat provides knowledge through empirical experience, i.e. direct observation of the hilal. From an epistemological perspective, the integration of ḥisāb and rukyat shows that knowledge about the beginning of the Hijri month comes not only from empirical data (rukyat) but also from the results of rational calculations (ḥisāb).

b. Ontological aspects:

Ontology²⁸ is concerned with what exists, or the reality that is the object of study.²⁹ In this context, ontology examines what is actually being measured or observed in ḥisāb and rukyat. Essentially, both methods focus on the same physical reality, namely the hilal (first crescent moon) that marks the beginning of the Hijri month. Ḥisāb sees hilal as a phenomenon that can be calculated for its position in space and time through astronomical laws. Rukyat, on the other hand, sees hilal as a phenomenon that must be observed directly in the sky. The ontology of this integration shows that hilal is a real entity and can be accessed through various perspectives both mathematically and visually. Thus, the integration of ḥisāb and rukyat recognizes that hilal as an object of knowledge has dimensions that can be approached from different, yet complementary, perspectives.

c. Axiological Aspects:

Axiology deals with the value and purpose of knowledge or action. In the integration of ḥisāb and rukyat, the axiological aspect relates to the values underlying the use of both methods as well as the goals to be achieved. From an axiological point of view, the integration of ḥisāb and rukyat aims not only to achieve accuracy in determining the beginning of the month, but also to achieve the unity of the ummah and minimize divisions in the implementation of worship based on the Hijriyah calendar. This integration reflects the values of justice, togetherness, and harmony, where the

²⁶ Wijaya, *Filsafat Kesatuan Ilmu Pengetahuan: Unity of Sciences Sebagai Format Integrasi Keilmuan UIN Walisongo*, 160.

²⁷ Epistemology or the theory of science discusses in depth about three main issues: First, about the origin of knowledge, such as the source and how to obtain true knowledge. Second, about the nature of knowledge, namely its characteristics and whether there are realities outside the mind that we can know. Third, about the truth of knowledge, i.e. how we judge and distinguish true knowledge from false. Harold and H. Titus, *Persoalan-persoalan Filsafat (Living Issues in Philosophy)* (Jakarta: PT. Bulan Bintang, 1984), 187.

²⁸ Ontology is a part of philosophy that discusses the nature of reality or the nature of what exists, including the nature of science as a reality. Darwis A. Soelaiman, *Filsafat Ilmu Pengetahuan Perspektif Barat dan Islam*, ed. oleh Rahmad Syah Putra, Cet. I (Aceh: Bandar Publishing, 2019), 12.

²⁹ Muhyar Fanani, *Ilmu Ushul Fiqh Dalam Perspektif Falsafah Kesatuan Ilmu, UIN Walisongo Semarang*, Pertama, vol. 44 (Semarang: Haja Mandiri, 2022), 23, <https://doi.org/10.1088/1751-8113/44/8/085201>.

results of *ḥisāb* are used to provide broader guidance, while *rukyat* ensures the affordability of those results by the wider community.

D. CONCLUSION

Ḥisāb in determining the beginning of the lunar month acts as an astronomical calculation method that produces predictions about the appearance of the new moon, so it can be considered a verification hypothesis. This prediction is then verified through *rukyat*, which is a direct observation of the *hīlal* in the sky. If *rukyat* succeeds in seeing the *hīlal*, then the prediction of *ḥisāb* is proven correct, and the beginning of the new month can be established. Thus, *ḥisāb* provides the theoretical framework while *rukyat* becomes the empirical verification tool, ensuring that the determination of the beginning of the month is based on actual observations. The ultimate goal of *ḥisāb* and *rukyat* is the same, which is to accurately determine the beginning of the month in the Hijri calendar. Unity of Science emphasizes that religious and scientific values do not have to conflict, but can work together to achieve a common goal.

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