

The Use of Hilal Remote Observatory in Determining the Beginning of the Hijri Month Islamic Law Perspective

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Abstract

This article discusses the use of the Hilal Remote Observatory (HRO) in determining the beginning of the Hijri month from the perspective of Islamic law. The determination of the beginning of the Hijri month has essential implications in determining Muslims' worship and daily activities. So far, hilal observations are carried out by direct observation methods, both without tools (naked eye) and with tools (telescopes, theodolites, and so on) in rukyat places. However, with the development of technology, HRO can now be done. HRO (long-range hilal observation) is a modern technology that allows remote observation of hilal using optical devices and communication technology. With HRO, an observer can move the device remotely and view the moon from various geographical locations in *real time*. This article aims to answer the formulation of the problem, namely how to use HRO in determining the beginning of the Hijri month according to Islamic law. This article produces an opinion that the existence of HRO technology in rukyatul hilal can be used and utilized because it can help provide certainty and confidence about the existence of Hilal. In addition, HRO can make it easy for observers to see the moon because it can be done wherever the observer is. As for the testimony of seeing the hilal of an observer who is far from where the instrument is placed, it cannot be used as a basis to establish the beginning of the Hijri month for the place where the observer is located unless the place where the observer is located west of where the instrument is located or is in the same matla' jurisdiction with the place where the instrument is located. This is because worship is based on position and time.

Keywords: hilal remote observatory; determination of the beginning of the Hijri month; Islamic law

Abstrak

Artikel ini membahas tentang penggunaan *Hilal Remote Observatory* (HRO) dalam penentuan awal bulan Hijriyah dalam perspektif hukum Islam. Penentuan awal bulan Hijriyah memiliki implikasi penting dalam menentukan ibadah dan aktivitas sehari-hari umat Muslim. Selama ini, pengamatan hilal dilakukan dengan metode pengamatan secara langsung, baik tanpa alat (mata telanjang) maupun dengan alat (teleskop, teodolit, dan sebagainya) di tempat rukyat. Namun, dengan perkembangan teknologi, HRO kini dapat dilakukan. HRO (pengamatan hilal jarak jauh) merupakan suatu teknologi modern yang memungkinkan pengamatan hilal dari jarak jauh menggunakan perangkat optik dan teknologi komunikasi. Dengan HRO, seorang pengamat dapat menggerakkan alat dari jarak jauh dan melihat hilal dari berbagai lokasi geografis secara *real-time*. Artikel ini bertujuan menjawab rumusan masalah yaitu bagaimana penggunaan HRO dalam penentuan awal bulan Hijriyah menurut hukum Islam. Artikel ini menghasilkan pendapat bahwa keberadaan teknologi HRO dalam rukyatul hilal boleh digunakan dan dimanfaatkan karena dapat membantu memberikan kepastian dan keyakinan tentang keberadaan hilal. Selain itu, HRO dapat memberikan kemudahan bagi pengamat untuk dapat melihat hilal karena dapat dilakukan dimanapun pengamat berada. Adapun kesaksian melihat hilal dari pengamat yang berada jauh dari tempat alat tersebut diletakkan, tidak dapat digunakan sebagai dasar untuk menetapkan awal bulan

Hijriyah untuk tempat dimana pengamat tersebut berada, kecuali tempat pengamat berada di sebelah barat dari tempat alat tersebut berada atau berada pada satu matla' wilayah hukum dengan tempat alat tersebut berada. Hal ini karena ibadah itu berdasarkan pada posisi dan waktu.

Kata Kunci: hilal remote observatory; penentuan awal bulan hijriyah; hukum Islam

Introduction

The determination of the beginning of the Hijri month has essential implications in determining Muslims' worship and daily activities. There are two methods in determining the beginning of the Hijri month: hisab and rukyat. So far, rukyat (hilal observation) is carried out by direct observation methods, either without tools (naked eye) or with tools (telescopes, theodolites, and so on) in the rukyat place where the tool is located. However, with the development of technology, various rukyatul hilal methods emerged. Among them comes the use of technology, including Charge Couple Device (CCD) in *rukyatul hilal* and hilal remote observatory (remote observation).

If previously, proving rukyatul hilal was only done by oath, then in this modern era, it is necessary to record hilal images that can prove the existence of hilal that can be seen. For this reason, it is necessary to use technology that can capture, record and process hilal images. Currently, a telescope has been developed that is connected to a CCD (Charge Couple Device) camera which then the results are processed on a computer to obtain hilal images. CCD helps direct vision and records it and clarifies it through technological engineering with light settings, sensors, etc.¹ The results of the MABIMS Falak Expert meeting in Yogyakarta on October 8-10, 2019, approved the use of CCD in rukyatul hilal because it does not violate the method of shari'a law because it is only a *wasilah* (intermediary) to facilitate rukyatul hilal whose provisions stick to several things, namely: after *ijtima'* (conjunction) and at sunset²

When CCD is performed where the observer and the device are in the same place, the Hilal Remote Observatory is performed with the observer and device in different places. Hilal Remote Observatory, or long-distance hilal observation, is a modern technology that allows observation of the hilal (crescent) from a distance using optical devices and communication technology. With the *Hilal Remote Observatory*, an observer can move the device remotely and view the moon from various geographical locations in real time.

This remote observation technology has been used in the observation of Fajar Sadiq. The dawn observation was carried out with the Sky Quality Meter (SQM) device. SQM processes the spectrum of incoming light and outputs it as data. The photometric magnitude of the sky's brightness will be displayed in MPSAS units (magnitude per

¹ Ismail Fahmi, 'Rukyatul Hilal with Digital Image Processing from Jurisprudence and Science Perspectives' (Surabaya: National Webinar Paper, 2020); Directorate of Islamic Affairs and Sharia Development, *Minutes of Falak Mabims Expert Meeting*, 2019, <https://tdjamaluddin.files.wordpress.com/2020/04/minit-pertemuan-pakar-falak-mabims-yogya-okt-2019.pdf>.

² Thomas Djamaluddin, 'Recommendations for the 2019 MABIMS Falak Expert Meeting in Yogyakarta', 2020, <https://tdjamaluddin.wordpress.com/2020/04/01/rekomendasi-pertemuan-pakar-falak-mabims-2019-di-yogyakarta/>; Directorate of Islamic Religious Affairs and Sharia Development, *Minutes of the Mabims Falak Expert Meeting*.

arcsecond). The brighter the magnitude, the lower the MPSAS value.³ The data generated by SQM will immediately be read in the form of data and stored in SQM's internal memory if the type of SQM used already has memory to store the data logger.⁴ This SQM was later developed into the Dawn Observation Automation System (SOOF) tool. This SOOF uses SQM integrated with the Raspberry minicomputer, which processes data from SQM into a graph automatically and is stored in Raspberry's internal memory.⁵ Supported by mobile wifi and internet data packages, this device can be accessed from anywhere so that users can observe dawn daily without going to the field. Users can access it wherever they use the Team Viewer, VNC, or Anydesk applications.⁶

With almost the same principle as SOOF, the Hilal remote observatory is now being developed. Hendro Setyanto from ImahNoong Observatory, Lembang Bandung, began to initiate hilal observation remotely in hisab rukyat practice activities held by the Falak Science Study Program, Faculty of Sharia and Law, Sunan Ampel UIN Surabaya at ImahNoong Observatory. In this activity, Hendro Setyanto explained remote observation and the virtual astronomer principle in *rukyatul hilal*, later known as the Hilal remote observatory.

This technology raises a big question: how does the use of the Hilal remote observatory determine the beginning of the Hijri month according to Islamic law? This is because different positions of tools and observers will also result in different laws. Not only in the validity of the data obtained but also in the validity of the results of these observations. If there is an oath, what is the oath if the tool and the observer are in different places? Then, the implications of these observations will impact the determination of the beginning of the Hijri month. Can these observations be used to determine the beginning of the Hijri month? If so (can be used as a basis for determination), for whom? Is it only for people where the tool is located or where the observers are located?

To answer these questions, the author collected literature on the Hilal remote observatory, scholarly opinions on the law of using technology, and testimony in rukyatul hilal. The author also uses the rules of jurisprudence that can be used to help find an assessment and compatibility between *hilal remote observatory* technology and the principles of Islamic law.

Results

Analysis of Islamic Law on the Use of Hilal Remote Observatory (HRO)

The existence of hilal remote observatory (HRO) technology is an effort or *ijtihad* to find out and record the existence of hilal that can be accessed whenever and wherever the observer is. *Ijtihad* is an earnest effort of scholars and scholars using their intellect to establish the law of something that has not been established *Qath'i* (indeed) in the Qur'an and Sunnah. Rukyatul hilal using tools is *ijtihad* to make it easier to see hilal, where natural conditions differ from conditions in the prophet's time. Different conditions, such as the sky and the development of information technology, require scholars to *ijtihad*

³ Ahmad Ridwan Al Faruq, *The brightness of the night sky in the direction of Zenith at Bosscha Observatory and initial analysis of Shubuh and Isya time using a sky quality meter* (Bandung: Universitas Pendidikan Indonesia, 2013).

⁴ Abdul Muid Zahid, 'The Meaning of Fajar Sadiq and the Utilization of SQM in His Observations', 2021.

⁵ M Basthoni, 'A Prototype of True Dawn Observation Automation System', *Jurnal Sains Dirgantara* 18, no. 1 (20 January 2021): 33–42, <https://doi.org/10.30536/J.JSD.2020.V18.A3475>.

⁶ Zahid, 'The Meaning of Fajar Sadiq and the Utilization of SQM in His Observations'.

related to these problems, including related to technology in rukyatul hilal which has no provisions in the Qur'an or Sunnah.

The presence of information technology, such as the hilal remote observatory, is a digital-based information technology that is intended or used to help determine worship rituals, namely knowing the existence of hilal. This goal differs from the purpose of rukyatul hilal directly (without tools) in general and rukyatul hilal with tools such as telescopes. The difference is *rukyatul hilal* without the essential tool is to directly look at the hilal, while rukyatul hilal with tools such as telescopes is to see the hilal captured by the tool and the hilal image has undergone magnification. The Hilal remote observatory sees the Hilal image captured by the telescope where the telescope is located and can be accessed by observers where the position is different from the position of the device.

As mentioned earlier, Muhammad Bakhit al-Muti'i allowed the use of instruments in rukyatul hilal, including telescopes, noting that the function of these devices was only to help see objects far or small that would be impossible to see without them and did not use reflection. It can also be applied to MRO technology. Where the main tool used is still the telescope, it's just that the image displayed by the telescope can be accessed and controlled by the observer remotely. Related to this, the author analyzes that the use of HRO in rukyatul hilal is okay to be used and utilized. With HRO able to track the presence of the moon before sunset and record the presence of the moon, it will be able to provide certainty and confidence that the results captured by the telescope are really hilal. In addition, HRO can make it easy for observers to see the moon because it can be done wherever the observer is. However, telescopes need to be constantly calibrated and tested so that their position matches actual conditions. Thus, the accuracy and efficiency of hilal observations can be accounted for.

The ability to use tools in performing rukyatul hilal is also based on the following fiqh rules:

للسائل حكم المقاصد

Meaning: "The will/intermediary has a law in accordance with the law of its purpose"

The use of HRO in rukyatul hilal actually does not violate the method of shari'a law because it is only as *a wasilah* (intermediary) to facilitate rukyatul hilal whose provisions stick to several things, namely: after *ijtima'* and at sunset.⁷ With this, HRO is expected to help minimize disagreements and controversies in determining the beginning of the Hijri month.

With regard to the testimony of seeing the hilal (*rukyatul hilal*) of an observer who is far from where the instrument is placed, it cannot be used as a basis to establish the beginning of the Hijri month for the place where the observer is located unless the observer's place is west of where the instrument is located. This is because worship is based on position and time. In determining the beginning of the Hijri month, the entry of time (the first day) is based on the visibility of the hilal. Suppose the eastern area can already see the Hilal. In that case, the western area can use the results of the rukyatul hilal in the eastern region to determine the beginning of the Hijri month, especially still in one *matla'* jurisdiction (state).

⁷ Djama'uluddin, 'Recommendations for the 2019 MABIMS Falak Expert Meeting in Yogyakarta'; Directorate of Islamic Religious Affairs and Sharia Development, Minutes of *the Mabims Falak Expert Meeting*.

Although there are differences of opinion on the validity of the use of tools to determine worship rituals, assessing the importance of using tools (technology) in rukyatul hilal, this technology is essential and legally used to provide certainty and confidence in Islamic legal products. The use of technology will be able to provide enrichment to the executors of worship, and the worship is really carried out on time.

Discussion

Instruments and Technology in Rukyatul Hilal

The determination of the beginning of the Hijri month is based on a hadith that reads:

صُومُوا لِرُؤْيَيْهِ وَأَفْطِرُوا لِرُؤْيَيْهِ فَإِنْ عُمِّيَ عَلَيْكُمْ الشَّهْرُ فَعُدُّوا ثَلَاثِينَ

It means: "Break when you see it (hilal), and break when you see it, if the moon is cloudy, then count thirty (even 30 days)"⁸.

According to the Arabic dictionary, the word *rukya*t in the hadith comes from the word: *ra'a* -*yaro* - *ru'yatan* which literally means seeing, understanding, guessing, and thinking⁹. The word *ra'a* or *rukya*h is defined by the meaning ابصر, see. Some interpret seeing must be with objects (*maf'ul bih*) in the form of concrete objects or can be seen by the eyes of the head. So seeing what is meant is the vision of the eyes of the head (*rukya*t / observation). The word *rukya*t in the hadith can also be interpreted with *adroka* / '*alima* i.e., understanding and seeing with the mind (by counting / *hisab*). Some interpret *dzonna* / *hasiba*, i.e., surmise sure / opinion / see with the heart.¹⁰

In the time of Prophet Muhammad (PBUH), seeing the moon was done with the naked eye without optical instruments by reliable witnesses. This is because at that time, the existing technology was very limited, and the sky conditions were still clear without sky pollution and light pollution. However, looking at the current reality, technology has developed more sophisticated with sky conditions that have been polluted by sky and light pollution. Some simple equipment began to be developed to help see the hilal, including rubu' mujayyab¹¹ and the location goal¹². Then developed, more sophisticated technologies, such as theodolites¹³ and telescopes¹⁴.

Regarding the use of rubu' mujayyab and location wickets, scholars allow it because the visuals displayed by the two instruments are the same, as when the observer sees with the naked eye, there is no reflection in them. Both instruments only help localize the observer's field of view where the hilal is likely to be located (visible). This is in contrast to theodolites and telescopes. Both tools display hilal images by reflecting and magnifying objects (hilal).

⁸ Imam Muslim, 'Shahih Muslim', 2022, https://carihadis.com/Shahih_Muslim/1810.

⁹ A. Warson Munawwir, *Indonesian Arabic Al-Munawwir Dictionary* (Yogyakarta: Pustaka Progressif, 1997).

¹⁰ Sakirman, 'Hisab and Rukyat Controversy in Setting the Beginning of the Hijri Month in Indonesia', *El-Falaky Journal of Falak Science* 1, no. 1 (2017); Shofwatul Aini, 'A Discourse of MABIMS New Criteria: Reading Difference Frequency Between Wujud Al-Hilal and Imkan Ar-Rukyat', *Justicia Islamica: Journal of Legal and Social Studies* 19, no. 1 (2022): 113–31; Ahmad Izzuddin, *Fiqh Hisab Rukyah; Uniting NU & Muhammadiyah in determining the beginning of Ramadan, Eid al-Fitr, and Eid al-Adha* (Jakarta: Erlangga Publishers, 2007).

¹¹ Siti Tatmainul Qulub, *Falak Science from History to Theory and Application* (Depok: Rajawali Pers, 2017), 67–127.

¹² Qulub, 181–92.

¹³ Qulub, 263–74.

¹⁴ Qulub, 275–97.

The meaning of the word *ro'a* in the hadith above impacts the meaning of the *rukyatul hilal* technique. Some scholars say that *rukyatul hilal*, such as Ibn Hajar, should be performed with the naked eye. The use of tools such as theodolites and telescopes that use a way to reflect light and magnify the hilal image is not categorized as *rukyatul hilal* because it is feared that what is seen is not the original form (*dzohir*).¹⁵ Then what about the latest technology that can operate tools remotely, such as Hilal remote observatory?

Hilal Remote Observatory (HRO) in Rukyatul Hilal

Hilal Remote Observatory (HRO) is a hilal (new crescent) observation conducted remotely. HROs utilize advanced optical telescopes, satellite monitoring, sky photography, and long-distance communications to observe the moon. The sophisticated telescopes used in HRO can be in strategic locations to observe the moon with optimal sky conditions, and the results of the observations can be monitored in real time by observers elsewhere.

There are several standard stages in the MRO process, namely 1) observation preparation, 2) observation, 3) data storage management, 4) Pre-processing, data cleaning, calibration, and stacking, 5) Post-processing, analysis, journaling and/or social media posts.

Previously, there was a remote observatory system in twilight observation called the Twilight Remote Observatory (TwRO). TwRO is an instrumentation system composed of cameras and brightness sensors Unihedron Sky Quality Meter (SQM), which has the main purpose of measuring the brightness (magnitude) of the sky at the time of Syria (Twilight) with direct measurement methods and measurements with imaging methods. Measurements will be carried out over a long time in various locations.

The Hilal remote observatory uses almost the same method, where the telescope operation is carried out remotely through an observer's computer using the Team Viewer, VNC, and Anydesk applications. Thus, observers can access anything the telescope observes from wherever they are.

The idea of the Hilal remote observatory was raised by Hendro Setyanto, astronomer and owner of ImahNoong Observatory, who is also the Deputy of the Falakiyah Institute of Nahdlatul Ulama (NU). He initiated this HRO in hisab rukyat practice activities held by the Falak Science Study Program, Faculty of Sharia and Law, Sunan Ampel UIN Surabaya. Due to the existence of Covid-19, hisab rukyat practice activities carried out by the Falak Science Study Program, Faculty of Sharia and Law, UIN Sunan Ampel Surabaya, in collaboration with ImahNoong Observatory, in 2020 and 2021, practical activities were carried out online. At that time, remote observatories began to be tried, *where the practical participants were at home moving telescopes at the Bandung ImahNoong Observatory*. In addition to moving the telescope, participants can take observational data, record it, and process it from their homes.

This principle was adopted by the Sierra Remote Observatory (SRO) in the Sierra Nevada Mountains. This SRO provides hosting services for remotely operated telescopes at Sierra Nevada Mountain locations. This SRO has been operating since 2007 and

¹⁵ Ibnu Hajar Al-Haitami, *Al-Fatawa Al-Kubra Al-Fiqhiyyah*, Juz: II (Beirut: Dar al-Fikr, 1983), 372.

continues until now. Today, SROs house more than 125 telescope systems and continue to grow. This SRO is reserved for day and night sky observation.¹⁶



Figure 1: Sierra Remote Observatories

Departing on the idea of hosting services for the telescope, then Hendro Setyanto wanted to make the same by putting telescopes in several places in Indonesia, which could then be operated remotely. Thus, hilal observations can be carried out at any time simultaneously from various regions in Indonesia and even the world; observational data can be monitored, recorded, and collected; and coordination of observations to then be decided on the determination of the beginning of the Hijri month can be done quickly using the help of communication technology.

Through the ImahNoong Observatory and the NU Falakiyah Institute, Hendro Setyanto began to develop a remotely controlled hilal observation observatory (HRO) to ensure the hilal observation equipment was installed correctly. The goal is to prove that the hilal seen is indeed a hilal according to the development of science. The hope is that this technology can realize an Indonesian Hijri calendar so Muslims can worship together.¹⁷

¹⁶ 'Sierra Remote Observatories: World Class Telescope Hosting for Remote Astronomical Imaging, Data Acquisition, Satellite Tracking and Space Communications', accessed 13 June 2023, <https://www.sierra-remote.com/>.

¹⁷ M. Zaid Wahyudi, 'Menggugat Kriteria Hilal', *Kompas*, 2020, <https://www.kompas.id/baca/ilmu-pengetahuan-teknologi/2020/05/22/menggugat-kriteria-hilal>.

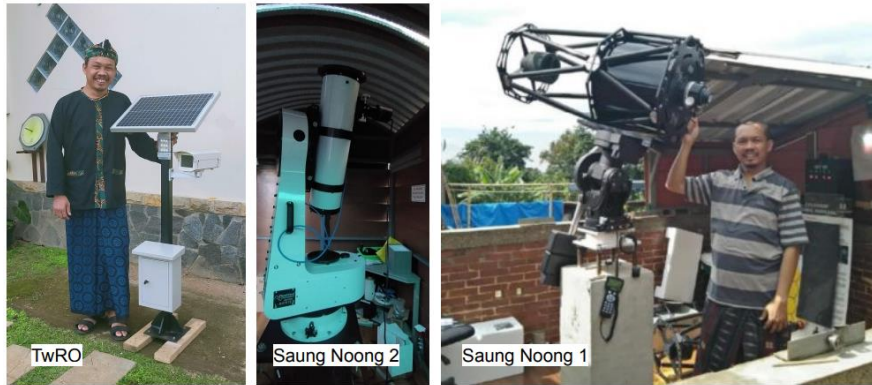


Figure 2. Remote Observation System at ImahNoong Observatory



Figure 3. Overview of Nusantara Observatory

Judging from the technical work, HRO basically uses some help tools and applications, 1) telescopes installed at the observation point function to capture hilal images in the rukyat place where the telescope is placed, 2) computers and devices that function to connect telescope observations to computers, 3) VNC and Anydesk team viewer applications used to connect telescope observations where the telescope is located with observers who is somewhere else.



Figure 4. Technical work hilal remote Observatory

Thus, this HRO raises two questions. First, how are these tools (some tools in HRO) used in the rukyatul hilal Islamic legal perspective? Second, how does the law of testimony see the moon from a place different from where the observation device is located?

Scholarly Opinion on the Use of Tools in Rukyatul Hilal

Scholars differ on the law of using tools in rukyatul hilal.¹⁸ Some allow it, but others don't, as follows:

1. Scholars who accept the use of tools

One of the uses of tools in assisting the implementation of worship is using telescopes or other aids in rukyatul hilal. Related to this, Abdul Hamid bin al-Husayn al-Daghistani ash-Syarwani in the book *Hawashii Tuhfatul Muhtaj bi Sharhil Minhaj*, explains that rukyatul hilal is mainly done without using tools. Still, it is also allowed to use tools such as water, *ballur* (white objects such as glass), something that brings the far away and that enlarges the small in view (such as a telescope).¹⁹

Muhammad Bakhit al-Muti'I, in the book *Irsyadu Ahli al-Millati Ila Itsbaati al-Ahillah*, argues that the testimony of a person who sees the hilal even though he sees with binoculars is acceptable because what is seen through the medium of the instrument is the hilal itself (*'ainul hilal*) and its function is only to help see distant or small objects that are impossible to see without the tool. According to him, rukyat with binoculars is the same as rukyat with eyes and using glasses to read.²⁰

Ulama ahli falak nusantara also fatwa about the permissibility of using aids in rukyatul hilal. Sheikh Muhammad Manshur ibn Abdul Hamid ibn Muhammad better known as Guru Manshur Betawi, for example, in his book that specifically discusses the issue of rukyatul hilal entitled *Mizan al-I'tidal fi Takmilati Jawab as-Su'al fi Mas'alati Ikhtilafi al-Matali'i wa Ru'yat al-Hilal*, states: "As for looking at the moon with a magnifying glass is the same as looking directly with the eyes of the head, without any difference".²¹

2. Scholars who reject the use of tools

In terms of the use of tools to assist the implementation of rukyatul hilal, Ahmad Ibn Hajar al-Haitami, in the book *Hamisy Hawashii Tuhfatul Muhtaj bi Sharhil Minhaj* asserts that rukyatul hilal is performed after ghurub and without the use of intermediaries such as glass or mirrors لا بواسطة نحو مرآة.²² Implementing rukyatul hilal like this uses the *rukyah bil fi'li* method with the naked eye because it refuses to use tools (*nazarah*) that can reflect light. It is feared that this reflection method is not the original form (*dzohir*).²³

In responding to this development, almost all scholars stated the permissibility of using modern technology that helps facilitate the process of rukyatul hilal, especially in enlarging and bringing closer (*al-muqarrib*) views. Shaykh Muhammad ibn 'Uthaymeen (r), as recorded in al-Fataawa ash-Shar'iyah fi al-Masail al-Ashriyyah Min Fataawa Ulama al-Balad al-Haram, stated that the rukyatul hilal decree in any way must be accepted and held in any way²⁴.

¹⁸ Ma'ruf Amin, 'Rukyah for the Determination of the Beginning and End of Ramadan According to Sharia Views and Science and Technology Spotlight', in *Collection of Rukyah Discussion Papers with Technology: Efforts to Find Common Views on the Early Determination of Ramadan and Shawwal* (Jakarta: Gema Insani, 1994), 73.

¹⁹ Abdul Hamid Al-Syarwani, *Hawasyi Tuhfatul Muhtaj*, Volume III (Kairo: al-Maktabatut Tijariyah al-Kubra, n.d.), 332.

²⁰ Muhammad Bukhit al-Muti'i, *Ershad Ahli al-Millati ila Itsbaati al-Ahillah* (Egyptian: Kurdistan al-Ilmiyah, 1329), 293–94.

²¹ Muhammad Manshur ibn Abdul Hamid ibn Muhammad, *Mizan Al-I'tidal Fi Takmilati Jawab as-Su'al Fi Mas'alati Ikhtilafi Al-Matali'i Wa Ru'yat Al-Hilal* (Jombang: Ma'had al-'Aziziyah al-Islami, n.d.).

²² Ahmad Ibnu Hajar al-Haitam, *Hamisy Hawasyii Tuhfatul Muhtaj bi Syarhil Minhaj* (Egypt: Mushthafa Muhammad, n.d.).

²³ Al-Haitami, *Al-Fatawa Al-Kubra Al-Fiqhiyyah*, 372.

²⁴ Amir Hamzah, *Recent Fatwas 3* (Jakarta: Darul Haq, 2004).

Based on the opinions of the scholars above, it is known that Muhammad Bakhit al-Muti'i proposed the ability of rukyatul hilal by using a tool with several important notes that must be considered, namely: 1) the function of the tool is only to help the vision to see objects far or small that are impossible to see without the tool, 2) the tool must not be by reflection, Because what is seen through the monitor is not the hilal itself but sees the hilal image.

Muhammad Bakhit al-Muti'i (1856-1935 A.D.) was a scholar of the Hanafi madhhab whose style of thought was a *ro'yi* expert because it used *qiyas* (analogies). The hadith commandment rukyatul hilal is not explained rukyat using tools. He uses the analogy of rukyat with the medium of large binoculars is the same as rukyat with eyes without a difference, just like the use of glasses for reading. However, he remained cautious in issuing fatwas by limiting the use of tools for rukyatul hilal so that the meaning of rukyatul hilal did not come out of what the Prophet (saw) ordered.²⁵ During al-Muti'i's lifetime, the first telescope type of refractor (refraction) was invented by Galileo Galilei (1564-1642 AD), and then in 1663 AD, the reflector telescope was founded by James Gregory.

While the opinion of Ibn Hajar al-Haitami (1488-1552 AD) that does not allow using tools in rukyatul hilal is a form of caution so that what is seen is really hilal, not pictures or shadows of hilal or even other planets that resemble hilal. Seeing that the reason for not allowing it is "the concern seen is not hilal", then if the reason can be eliminated, rukyatul hilal by using tools are allowed. Ibn Hajar al-Haitami was a scholar of the Shafi'i madhhab whose style of thought was to combine *ro'yu* and hadith. At the time of al-Haitami, no telescope was found that could help rukyatul hilal.

Ulema Opinion on Witnessing Seeing Hilal (Shahadah Rukyatul Hilal)

Seeing the moon looks like a simple thing, but not everyone has the ability to be able to see the moon correctly. It takes mature science, precise visuals, and daring to be responsible for the truth of the hilal seen. Often what happens in the field is that observers are fooled by clouds illuminated by sunlight or even other celestial bodies. This is because the hilal is a very thin curved beam of light. It takes certainty and validity that what is seen is really hilal. Therefore, a rule of testimony in viewing the hilal is made to guarantee the validity of the hilal that is Observed.

The testimony of rukyatul hilal is called the term *shahadah rukyatul hilal*. This is because the essence of the testimony contains the redaction of the oath in the name of God on the visible truth of the hilal. *Shahadah* rukyatul hilal (witnessing to see hilal) is one of the conditions that must be fulfilled for the validity of a decree at the beginning of crucial Hijri months. *This Shahadah* legitimizes a person's testimony about his vision of the hilal. Technically, the rukyatul hilal *shahadah* opens with the sentence *syahadatain*, followed by the redaction of the sincerity of information that a witness has seen hilal.

Shahadah is usually attached to the state of the witness (the person who claims to have seen the hilal). Shaart, from a witness among him, is Islam, just, puberty, independent, *taklif*, male, smart, not mute, not blind, *muruah*, and others. The testimony of a witness must be checked to determine whether it is true or not. The guidelines for examining the hilal viewing testimony of a witness are the hilal position and the time of

²⁵ Desy Kristiane, "The Use of Telescopes for Rukyat Al-Hilal: An Analysis of Muhammad Bakhit Al-Muti'i's Opinion with Ibn Hajar Al-Haitami", *Bilancia* 13, no. 2 (2019): 331–54.

viewing the hilal. The testimony will be adjusted to the results of the hisab that has been done before.

Conclusion

The existence of hilal *remote observatory* (HRO) technology is an effort or *ijtihad* to find out and record the existence of hilal that can be accessed whenever and wherever the observer is. HRO in rukyatul hilal can be used and utilized because it can help provide certainty and confidence that the results captured by the telescope are really hilal. In addition, HRO can make it easy for observers to see the moon because it can be done wherever the observer is. There is a difference of opinion among scholars about the use of technology in rukyatul hilal. The use of HRO in rukyatul hilal is only as *a wasilah* (intermediary) to facilitate rukyatul hilal whose provisions stick to several things, namely: after *ijtima'* and at sunset.

With regard to the testimony of seeing the hilal (*rukyatul hilal*) of an observer who is far from where the instrument is placed, it cannot be used as a basis to establish the beginning of the Hijri month for the place where the observer is located, unless the place of the observer is west of where the instrument is located or is in the same *matla'* jurisdiction with which the instrument is located. This is because worship is based on position and time.

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