LOCAL WISDOM TECHNOLOGY: The *Bintang Lhee* as *Qibla* Direction Instrument in Contemporary Aceh

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Abstract: This qualitative case study explores *Bintang Lhee*, a traditional Acehnese astronomical method for determining the qibla direction through naked-eye observation of three aligned stars (*Alnitak, Alnilam,* and *Mintaka*). The study highlights its technical characteristics and its cultural–religious significance as a form of local wisdom integrating astronomy, faith, and Acehnese identity. Despite its observational limitations, *Bintang Lhee* represents valuable indigenous knowledge. This study suggests that incorporating such traditional methods into contemporary scholarship can enrich interdisciplinary research in cultural astronomy and indigenous knowledge systems.

Keywords: Local Wisdom Technology, *Bintang Lhee, Qibla* Direction Instrument, Contemporary Aceh.

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Introduction

Indonesia, with its 1,340 ethnic groups and diverse cultural heritage, ranks among the top five countries in the world in terms of ethnic diversity.[1] Despite this richness, cultural astronomy remains an underexplored field in Indonesia. To date, there has been limited academic attention to the study and preservation of Indigenous astronomical knowledge. A good example comes from Aceh Besar Regency in Aceh Province, where the traditional *Bintang Lhee* method, used to determine *qibla* direction based on the appearance of stars, is slowly being forgotten. Many local people now see it as outdated and no longer practical for the modern era. As one villager explained, "*Lawet nyoe rame nyang hana meuphom lee cara kalon bintang keu tanda kiblat*," which means, "These days, a lot of societies are unfamiliar with how to measure the star which is a *qibla* sign". In addition, Rahmalia indicates this method is primarily understood only by a few persons and remains undocumented.[2] More concerningly, many younger generations in Aceh are entirely unaware of its existence.

The other hand, cultural astronomy has gained scholarly interest in countries such as Australia, New Zealand, the UK, parts of Africa, and the Americas.[3] Key areas of study include general frameworks such as astronomy as a cultural system, its societal impacts,[4] and the cultural role of stars the Mâori Astronomy.[5] More focused research includes works on Indigenous star maps,[6] seasonal star identification,[7] lunar and eclipse traditions are also explored.[8]

In the context of *qibla* direction studies, numerous works have examined various methods for determining the *qibla*, including perspectives from Islamic jurisprudence, the use of both traditional and modern instruments, and contemporary approaches. For example, the study of the Kaaba is not merely

as a structure but as the focal point of direction for Muslims.[9] Meanwhile, another study analyzes methods of determining the *qibla* direction using various modern instruments and *qibla* direction applications.[10] On the other hand, Indonesia's scholarly inquiry into cultural astronomy[11] and *qibla* was initiated through studies on the cosmological systems of the Bugis people,[12] followed by research on the *Pranata Mangsa* calendar.[13] Other studies primarily focus on traditional approaches to seasonal determination[14] and the function of *Keuneuneng* as an agricultural calendar,[15] while Abdul Mannan discussed its significance for the livelihood of Acehnese fishermen.[16]

Several other studies on the methods of determining the *qibla* direction have been conducted by scholars, which focus on using stellar positions[17] as navigation tools[18] and to determine the *qibla* direction.[19] Despite its significant scientific and cultural value,[20] in-depth research on the *Bintang Lhee* method in Aceh remains scarce. This traditional practice holds great potential for development, particularly in the fields of education and cultural preservation. The absence of academic documentation and limited attention to Aceh's local astronomical heritage risk the permanent loss of this valuable knowledge. More than just a religious tool, the *Bintang Lhee* method reflects the deep ecological and cosmological relationship between humans and the universe. Therefore, this study is essential for understanding, preserving, and transmitting local astronomical knowledge to future generations. This study aims to investigate the technical description and underlying operational principles of the traditional *Bintang Lhee* method employed by the Acehnese community to determine the *Qibla* direction.

Method

This study employs a qualitative case study approach to examine the traditional astronomical practice of *Bintang Lhee* within Acehnese society, particularly in relation to *qibla* direction determination. The research was conducted in Pusong Village, Lhokseumawe Regency, Aceh Province, Indonesia, which was purposively selected due to the community's sustained preservation of collective memory and oral traditions concerning the *Bintang Lhee* method. The primary data sources comprise three groups: (1) local elders with practical experience in applying *Bintang Lhee*, (2) religious leaders who integrate this knowledge into ritual and mosque orientation practices, and (3) community members who maintain intergenerational knowledge of traditional *qibla* determination. Participants were identified through snowball sampling, beginning with key informants and extending through subsequent referrals.

Data collection was undertaken using multiple complementary techniques. First, semi-structured interviews were conducted to document narratives on the identification, transmission, and perceived accuracy of *Bintang Lhee*. Second, participant observation during community religious activities provided insights into how astronomical knowledge is practiced and negotiated in daily contexts. Third, a documentary and literature review was carried out, focusing on religious texts, local manuscripts, and previous ethnographic accounts related to indigenous Acehnese astronomy.

The analysis combined qualitative interpretation with astronomical verification. Interview transcripts and field notes were carefully reviewed, allowing recurring ideas to be identified and grouped into broader themes such as celestial markers, ritual practice, and religious authority. These themes were further enriched with insights from participant observation and cross-checked

against documentary sources, ensuring both contextual depth and historical continuity. Alongside this thematic analysis, the open-source astronomy software Stellarium was used to simulate the night sky at the specific times and locations mentioned by participants. This process enabled the precise positioning of the *Bintang Lhee* constellation and the recording of parameters such as azimuth, altitude, and seasonal visibility. The simulated data were then compared with community accounts, highlighting both points of convergence and areas of divergence between traditional knowledge and modern astronomical calculation.[21]

Result and Discussion

The findings are categorized into four main themes: (1) Technical Description and Practice of the *Bintang Lhee* Method, and (2) Cultural and Religious Values Embedded in the Practice.

Technical Description and Practice of the *Bintang Lhee* Method

The *Bintang Lhee* method represents a form of traditional Acehnese knowledge used to determine the *qibla* direction by observing three stars aligned in a straight line. In Acehnese culture, these stars, collectively referred to as *Bintang Lhee*, are thought to serve as indicators of the cardinal directions: north, south, west, and east. They are visible in the night sky throughout the year. According to Tgk. Abdullah, a respected religious leader in Pusong Village, Lhokseumawe, the *Bintang Lhee* constellation can be observed on any night of the year, with the optimal viewing period occurring between approximately 10:00 p.m. and 2:00 a.m. Western Indonesian Time (WIB). As he explained:[22]

> *Bintang Lhee* is typically observed during the dry season, when atmospheric conditions allow for clear visibility of celestial objects. Under favorable weather conditions, the stellar configuration becomes visible from approximately

7:00 p.m. onward. The three stars appear in a near-vertical linear alignment, which functions as a practical celestial reference for determining the *qibla* direction".

The application of this method within the community relies entirely on naked-eye observation, without the use of modern instruments. The observation process is not conducted collectively, as only a limited number of local figures possess knowledge of this method. According to Mr. Bukhari, an elder and respected Tuha Peut figure in Pusong Village, Lhokseumawe, who is familiar with the practice, he explained:[23]

"The determination of the *qibla* direction and navigational orientation is traditionally conducted by standing at the coastline and identifying the position of *Bintang Lhee*. A linear marker is then traced on the ground to represent the western direction. From this reference line, an additional line is constructed in an opposite or intersecting orientation, serving as a practical indicator for the alignment of prayer rows".

In addition, *Bintang Lhee* also serves as a traditional navigational guide for community members engaged in fishing. This practice is particularly common among fishermen operating small boats for short-distance fishing trips. In contrast, larger and more modern vessels sometimes employ the Global Positioning System (GPS) as a navigation tool. However, in cases where the GPS malfunctions or experiences system errors, fishermen revert to using traditional knowledge to determine direction. As stated by Tgk. Tarmizi, a pawang (ship navigator):[24]

"In recent years, *Bintang Lhee* has no longer been widely used on large fishing vessels, as many of these boats are now equipped with GPS systems that assist in determining directions for fishing activities as well as for returning to shore. However, on smaller boats, *Bintang Lhee* remains highly useful for

> fishermen in determining orientation. Even on newer or more technologically advanced vessels, traditional methods are sometimes relied upon when the onboard GPS system experiences malfunction or technical errors."

The knowledge of the *Bintang Lhee* method has traditionally been passed down orally from generation to generation, whether through religious study gatherings (*pengajian*) or during fishing activities at sea. Over time, however, the rapid advancement of technology has led to a gradual decline in its use, as various *Qibla*-direction applications easier for the millennial generation to understand have become more prevalent. As noted by Ahmad, a 68-year-old elder of Pusong Village:[25]

> I first learned the *Bintang Lhee* method from my father, who explained that it was the way used by ureung awai (people of earlier generations) to determine direction. The orientations referred to include the *qibla* direction, the direction for fishing activities, and the route for returning to the gampong after fishing voyages. Beyond navigation, *Bintang Lhee* also served as a reference for determining planting and harvesting seasons. Furthermore, it was used to identify the types of crops suitable for cultivation at particular times. However, conditions have changed. Many young people—and even adults—are no longer familiar with *Bintang Lhee* due to their reliance on mobile phones. In contrast, among fishermen, particularly those from fishing families, knowledge of the *Bintang Lhee* method remains relatively well preserved, as it constitutes fundamental knowledge for going to sea. Without this knowledge, fishermen risk becoming disoriented at sea, potentially drifting not back to their gampong but to foreign territories, such as Myanmar).

The *Bintang Lhee* method is a traditional *qibla* determination system based on night-sky observation, passed down through generations within Acehnese society, particularly in rural areas

such as Pusong Village, Lhokseumawe. Technically, the method focuses on observing three bright stars within the Orion constellation "*Alnitak, Alnilam,* and *Mintaka"*. These three stars form a distinctive straight line that, in Acehnese local tradition, serves as an indicator of the westward direction. Locally, this configuration is known as *Bintang Lhee* (literally, "three stars").

Astronomically, these stars form part of *Orion's Belt*, an easily recognizable asterism in the night sky, situated along the celestial equator and appearing in a relatively consistent position at certain times of the year. In the Acehnese local context, practitioners of the method observe the moment when the "*Bintang Lhee"* appears perfectly vertical above the horizon. When the straight line formed by the three stars is seen as vertically aligned to the naked eye, the direction of that line is understood to indicate west. In practice, the observer aligns their body with the stellar line, from which the *qibla* direction—towards the northwest, consistent with Aceh's geographical position relative to the Kaaba in Mecca—is then determined.

Figure 1. Constellation Orion[26]

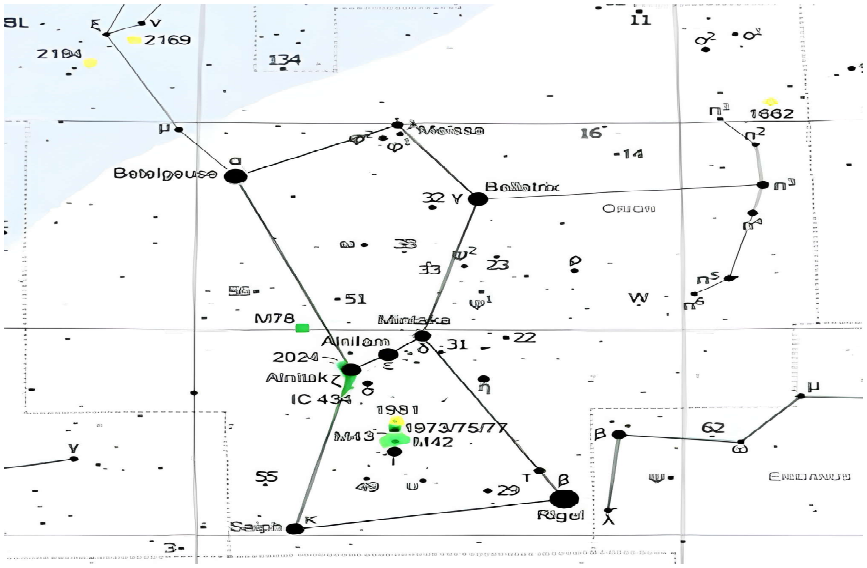

Figure 1. Depicts the Orion constellation, in which the three stars form part of Orion's Belt—a star formation. This star formation is easily recognizable in the night sky because it lies along the celestial equator and appears in a relatively consistent position at certain times of the year. The application of this method involves not only astronomical observation but also practical skills and intuitive experience. Those who employ the method—typically customary leaders, mosque imams, or elder community members—possess a deep understanding of the seasonal timing of *Bintang Lhee*'s appearance. They are aware that the constellation can be observed clearly in every month of the year; however, certain months are highly recommended for *qibla* determination, while others are considered unsuitable as reliable indicators.

Figure 2. Azimuth Deviation Chart

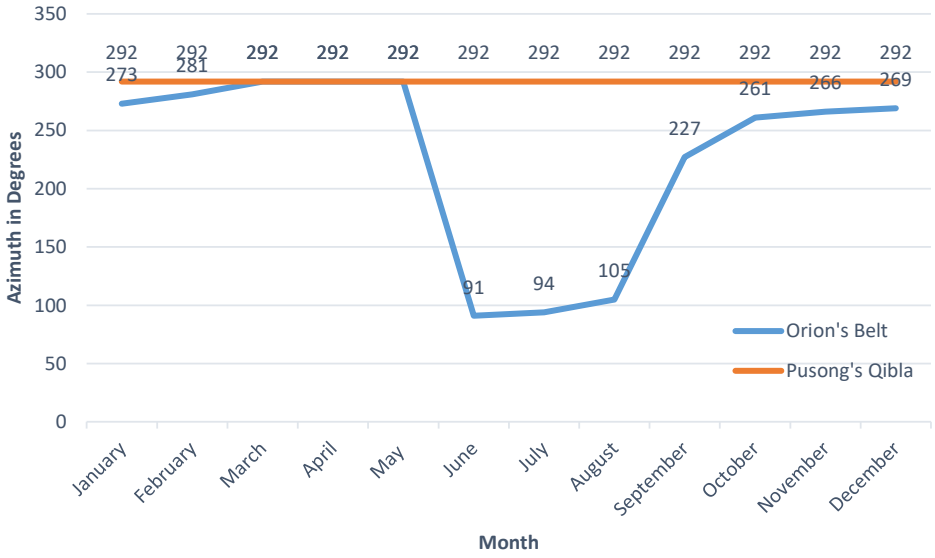

Figure 2. Demonstrates that *Orion's Belt* cannot serve as a consistently accurate reference for determining the *qibla* direction throughout the year. This limitation is due to substantial variations between the azimuth values of *Orion's Belt* and the established

qibla azimuth for Pusong Village. Alignment between the two occurs only within a limited temporal window, specifically from March 26th to May 31st each year with azimuth values converging at approximately 292 . Outside this period, notable discrepancies are observed. During June, July, and August, the azimuth deviations are particularly pronounced, measuring 91 , 94 , and 105 , respectively. In other months, the differences are less pronounced, with an average azimuth of 267 ; however, these values remain suboptimal as a reliable *qibla* reference. Observationally, *Orion's Belt* is visible throughout the year, rising at approximately 19:00 and setting at around 06:12 local time.

Cultural, Religious, and Local Wisdom Values in the *Bintang Lhee* Method

The findings indicate that the *Bintang Lhee* method functions not only as a traditional tool for determining direction—particularly the *qibla*—but is also closely intertwined with the cultural values, religious principles, and local wisdom embedded in the daily life of the Acehnese community. In an in-depth interview, Tgk. Muhammad Ali, a religious leader and elder of the village, stated that:[27]

> From an early age, we were taught to observe *Bintang Lhee* only on clear nights, meaning when the sky is free from clouds or overcast conditions. When the star appears directly overhead in a vertical position, it indicates that the direction toward Mecca is located at that point, that is the *qibla* direction. I was also taught by my parents that *Bintang Lhee* is not solely related to determining the *qibla*, but is likewise useful for identifying cardinal directions and seasonal patterns. Furthermore, my parents and local tengku (religious scholars) often emphasized that knowledge of *Bintang Lhee* also carries a spiritual dimension, as it fosters deeper faith in Allah, who has created the heavens as an exceptionally precise system of guidance; one that cannot be replicated by any other being.

This statement affirms that the "*Bintang Lhee"* method is not solely functional but also carries profound spiritual and theological significance. The community perceives the sky as a manifestation of the signs of God's greatness, serving as a guide for life, including in the performance of religious obligations. Culturally, this method forms part of local rituals transmitted through oral tradition and direct practice. In Pusong's tradition, determining the *Qibla* direction using the *Bintang Lhee* is typically carried out by religious leaders and is sometimes attended by community members, particularly during the construction of a new mosque or musalla. On such occasions, both elders and youth gather at night to observe the stars together and deliberate collectively to establish the *qibla* direction based on the constellation's position. In an interview, Abdul Rahman, the Geuchik (village head) of Pusong, explained that:[28]

> From earlier generations, we were taught to observe *Bintang Lhee* on clear nights, that is, when the sky is free from cloud cover. When the star appears directly overhead in a vertical position, it signifies that the direction toward Mecca lies at that point, which refers to the *qibla* direction. I was also taught by my parents that *Bintang Lhee* is not limited to determining the *qibla*, but is also useful for identifying cardinal directions and seasonal cycles. Furthermore, my parents and local tengku (religious scholars) often emphasized that knowledge of *Bintang Lhee* also holds spiritual significance, as it strengthens faith in Allah, who has created the heavens as a highly precise system of guidance that cannot be replicated by any other being.

The findings indicate that the *Bintang Lhee* method embodies a strong element of local wisdom, in which knowledge is not codified in written form or stored in devices, but preserved within the community's collective memory and lived experience. Nevertheless, most informants expressed concern over the declining

use of this method, particularly among the younger generation. As noted by Fadli, a 22 year old resident of the village:[29]

> I first learned about the *Bintang Lhee* method from my parents, who are fishermen. It is traditionally observed on clear nights, meaning when the sky is free from clouds or overcast conditions. When the star appears directly overhead in a vertical position, it indicates the direction toward Mecca, that is, the *qibla* direction. I was also taught that *Bintang Lhee* is not limited to determining the *qibla*, but is also useful for identifying cardinal directions and seasonal patterns. Furthermore, my parents and local tengku (religious scholars) often emphasized that knowledge of *Bintang Lhee* carries spiritual significance, as it contributes to strengthening faith in Allah, who has created the heavens as a highly precise system of guidance that cannot be replicated by any other being. However, on a personal level, I find it easier to determine the *qibla* direction using smartphone applications, such as *Google Qibla Finder*, where simply activating the application immediately displays the *qibla* direction.

The *Bintang Lhee* method reflects not only the local astronomical skills of the Acehnese community but also embodies cultural, religious, and local wisdom values that strengthen the community's collective identity. As a body of knowledge developed through empirical experience, the method illustrates how local people socially and spiritually interpret the order of the night sky. From a cultural perspective, *Bintang Lhee* is part of a traditional knowledge system rooted in direct observation of celestial motion patterns. The alignment of three bright stars in the Orion constellation *Alnitak, Alnilam*, and *Mintaka* forming a straight line in the night sky, serves as a reference for determining the westward direction, which is then used as a guide to the *qibla*.

This practice aligns with Lévi-Strauss's (1966) theory which posits that traditional societies construct knowledge structures through natural symbols that hold both meaning and practical function in daily life. In this case, the sky functions as a system of signs collectively understood by the local community and transmitted across generations.[30] From a religious standpoint, the method reflects a localized interpretation of the Islamic obligation to face the *qibla* during prayer. Although modern tools such as GPS and magnetic compasses are now more widely used, traditional methods like *Bintang Lhee* still represent a way for communities to fulfill religious requirements by reading the signs of nature. Durkheim's theory states that religion is an expression of social solidarity, explaining that such practices are not merely individual acts but part of collective rituals that reinforce the spiritual connection between people, their community, and the natural world.[31]

Furthermore, within the framework of Indigenous Knowledge Systems, as discussed by Agrawal (1995), the *Bintang Lhee* method exemplifies a local knowledge system shaped by accumulated experience and adaptation to the geographical environment.[32] This system is not merely technical expertise; it also embodies the wisdom of utilizing available natural resources for both religious and social purposes. In addition, this approach embodies the principles of cultural ecology, wherein environmental knowledge—specifically celestial understanding—functions in alignment with local norms and values. The findings of this study indicate that the *Bintang Lhee* method represents a close interrelationship between spirituality, nature, and culture. It functions not only as a ritual aid but also as a medium for informal education, a symbol of community identity, and a means of preserving the community's moral values.

Conclusion

This study shows that the *Bintang Lhee* method, although limited in astronomical accuracy particularly outside the March–May period carries profound cultural, religious, and educational significance for the Acehnese community. Its reliance on *Orion's Belt* as a natural reference illustrates how traditional societies have long integrated celestial observation into daily life, spiritual practice, and collective identity. The findings indicate that *Bintang Lhee* is not simply a technical tool for *qibla* orientation but rather a distinctive indigenous knowledge system that interweaves cosmology, faith, and cultural heritage.

The novelty of this research lies, first, in its systematic comparison of local knowledge with astronomical simulations in Stellarium, which provides fresh empirical insights into the strengths and limitations of *Bintang Lhee* as a method of *qibla* determination. At the same time, it highlights the broader socio-cultural dimensions of this practice, moving the discussion beyond technical precision to questions of heritage preservation and cultural resilience. By situating *Bintang Lhee* within both scientific and cultural frameworks, the study offers an original perspective that advances scholarship on indigenous astronomy and underscores its continuing relevance today.

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