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Verification of the Qibla Direction of Jami' Nurul Huda Mosque, Cangakan Village, Kanor, Bojonegoro

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Abstract: *Jami' Nurul Huda Mosque is one of the oldest mosques in Bojonegoro, with an age of approximately one and a half centuries. This mosque was founded by a Mataram Islamic warrior named Ki Ageng Wiroyudo in 1846 AD or 1262 Hijri. The purpose of this research is to determine the accuracy of the qibla direction of Jami' Nurul Huda Mosque in Cangakan, Kanor, Bojonegoro. This research is a field study with a descriptive qualitative approach. The primary data sources used are interviews with the mosque's management and observations. The results of this research conclude that the qibla direction of Jami' Nurul Huda Mosque in Cangakan, Kanor, Bojonegoro, when measured using the Mizwala Qibla Finder, shows an azimuth value of 302° compared to the qibla azimuth value of 294° 41'59", resulting in a difference of 8°. When calculated using Google Earth, the mosque building shows an azimuth value of 303°30'36" and a qibla azimuth value of 294°10'48". The importance of these research results for the local Muslim community lies in the certainty of the qibla direction, which is a crucial aspect in performing prayers. By knowing the correct qibla direction, worshippers can perform their prayers more devoutly and in accordance with Islamic law. The practical implications of this research include the potential adjustment of the mosque's qibla direction to enhance accuracy in worship and provide more accurate guidance for other mosques in the surrounding area. This can also raise awareness of the importance of regularly verifying the qibla direction, given the advancements in technology that allow for more precise measurements.*
Keywords: *Qibla Direction, Mizwala Qibla Finder, Google Earth*

Abstrak: Masjid Jami' Nurul Huda merupakan salah satu masjid tertua di Bojonegoro, dengan usia kurang lebih satu setengah abad. Masjid ini didirikan oleh seorang pejuang Islam Mataram bernama Ki Ageng Wiroyudo pada tahun 1846 Masehi atau 1262 Hijriah. Tujuan dari penelitian ini adalah untuk mengetahui akurasi arah kiblat Masjid Jami' Nurul Huda di Cangakan, Kanor, Bojonegoro. Penelitian ini merupakan penelitian lapangan (field research) dengan pendekatan kualitatif deskriptif. Sumber data primer yang digunakan adalah wawancara dengan pengurus masjid dan observasi. Hasil penelitian ini menyimpulkan bahwa arah kiblat Masjid Jami' Nurul Huda Cangakan, Kanor, Bojonegoro, ketika diukur menggunakan Mizwala Qibla Finder menunjukkan nilai azimuth 302° dibandingkan dengan nilai azimuth kiblat masjid yang sebenarnya yaitu 294° 41' 59", sehingga terjadi selisih 8°. Ketika dihitung menggunakan Google Earth, bangunan masjid menunjukkan nilai azimuth 303°30'36" dan nilai azimuth kiblat 294°10'48". Pentingnya hasil penelitian ini bagi masyarakat Muslim setempat terletak pada kepastian arah kiblat yang merupakan aspek krusial dalam melaksanakan ibadah shalat. Dengan mengetahui arah kiblat yang benar, jamaah dapat menjalankan ibadah dengan lebih khusyuk dan sesuai dengan syariat Islam. Implikasi praktis dari penelitian ini termasuk potensi penyesuaian arah kiblat masjid untuk meningkatkan ketepatan dalam beribadah dan memberikan panduan yang lebih akurat bagi masjid-masjid lain di daerah sekitarnya. Hal ini juga dapat meningkatkan kesadaran akan pentingnya memverifikasi arah kiblat secara teratur, mengingat kemajuan teknologi yang memungkinkan pengukuran yang lebih akurat.
Kata Kunci: Arah Kiblat, *Mizwala Qibla Finder, Google Earth*

A. Introduction

The importance of knowing the qibla direction in performing prayers is one of the crucial aspects of Islam. The qibla is the direction faced by Muslims during salah, one of the main acts of worship in Islam. The existence of the qibla serves as a reference for Muslims worldwide to face the Ka'bah,

which is considered the house of Allah SWT in Mecca, Saudi Arabia. This is as explained in the Quran, Surah Al-Baqarah, verse 114, as follows:

قَدْ نَرَىٰ تَقَلُّبَ وَجْهِكَ فِى ٱلسَّمَآءِ ۖ فَلَنُوَلِّيَنَّكَ قِبْلَةً تَرْضَىٰهَا ۚ فَوَلِّ وَجْهَكَ شَطْرَ ٱلْمَسْجِدِ ٱلْحَرَامِ ۚ وَحَيْثُ مَا كُنتُمْ فَوَلُّوا۟ وُجُوهَكُمْ شَطْرَهُۥ ۗ وَإِنَّ ٱلَّذِينَ أُوتُوا۟ ٱلْكِتَٰبَ لَيَعْلَمُونَ أَنَّهُ ٱلْحَقُّ مِن رَّبِّهِمْ ۗ وَمَا ٱللَّهُ بِغَٰفِلٍ عَمَّا يَعْمَلُونَ

"Verily, We have seen the turning of your face to the heaven (for guidance, Muhammad). So, We shall turn you to a Qiblah (prayer direction) that shall please you. Turn your face towards the Masjid al-Haram (in Mecca). And wherever you are, turn your faces towards it (when you pray). And indeed, those who have been given the Scripture (Jews and Christians) know well that, that (your turning towards the direction of the Ka'bah at Mecca in prayers) is the truth from their Lord. And Allah is not unaware of what they do." (Al-Baqarah:144).

Determining the qibla direction is not a new matter. In fact, since the time of the Prophet Muhammad SAW, Muslims have been seeking ways to accurately determine the qibla direction. Initially, the Prophet Muhammad SAW and his companions used the sun and stars as guides to determine the qibla direction. However, with the passage of time, the methods and technologies used have also evolved. The importance of knowing the qibla direction is not only limited to worship but also has social and cultural implications. When Muslims are outside areas where Muslims are in the majority, such as in Western countries, knowing the qibla direction is important to maintain diversity and unity with other Muslims. Additionally, knowing the qibla direction can also facilitate the design of mosque architecture, where the mihrab or the space where the imam stands typically faces the qibla (Ubaidillah, 2019).

The increasing attention of Indonesian society towards the qibla direction issue began to emerge after several astronomers conducted research on ancient mosques in Indonesia. Their research findings concluded that the majority of ancient mosques in Indonesia do not accurately face the qibla direction, thus requiring reassessment and realignment. This has become a widely discussed topic among Indonesian society. Therefore, research on testing the accuracy of one of the ancient mosques in Bojonegoro, believed to be 177 years old, becomes intriguing to investigate (BlogBojonegoro, 2023).

Several literature studies have also discussed the accuracy testing of the qibla direction of ancient mosques, including: First, the journal titled "Accuracy Test of Qibla Direction at Al-Mujahidin Mosque (Old Mosque of Watampone) Using Qibla Tracker, Istiwa' Stick, and Google Earth" written by Andi Molawaliada Patodongi, Muh Rasywan Syarif, and Zulhas'ari. The conclusion of this journal indicates that each method of qibla direction measurement shows different deviations. Using the Qibla Tracker method, a deviation of 17° to the west was obtained; using the Istiwa' Stick, a deviation of 16° to the west was obtained; and using Google Earth, a deviation of 14° to the west was obtained (Zulhadi, 2018).

Second, in Tri Pangestu Utami's thesis titled "Accuracy of Ancient Mosques in East Lombok Regency Using Istiwa'ani," it was found that after the qibla direction was corrected using the istiwa'ani tool, the accuracy level of ancient mosques in East Lombok Regency yielded interesting results. In this study, it was discovered that the ancient mosque Jami' Raudhatul Muttaqin Kotaraja had a deviation of 5° to the north after correction. Meanwhile, the ancient mosque Songak Sakra had a deviation of 24° to the north after correction. Based on these findings, it can be concluded that both ancient mosques cannot be categorized as accurate, considering the qibla direction deviations that exceed the tolerance limit established based on the results of the study using istiwa'ani (Utami, 2020). Masjid Jami' Nurul Huda, located on the banks of the Solo River, in Cangakan Village, Kanor District, Bojonegoro, holds significant historical value. Founded by an Islamic Mataram warrior named Ki Ageng Wiroyudo in the year 1846 AD or 1262 Hijriyah, the mosque has silently witnessed the development and struggles of the Muslim community in the region for over one and a half centuries. As one of the oldest mosques in Bojonegoro, Masjid Jami' Nurul Huda serves not only as a place of worship but also as a center for religious and social activities for the local community (Ainur Rofiq, 2023).

Initially, the determination of the qibla direction for Masjid Jami' Nurul Huda was done using the Rubu' mujayyab method. This was supported by the presence of many knowledgeable and skilled scholars in the field of astronomy in the village of Cangakan in ancient times. The issue of the accuracy of the qibla direction at Masjid Jami' Nurul Huda, located in Cangakan Village, Kanor District, Bojonegoro, is of significant concern due to the traditional method used to determine the qibla direction in the past. Although this method was suitable for the capabilities and knowledge available at that time, it may not have had the necessary level of precision compared to modern technology. With the advancement of technology and knowledge, there is a possibility that the qibla direction determined centuries ago may have significant deviations. Therefore, this research aims to address the potential inaccuracies by using more sophisticated measurement tools and techniques such as Mizwala Qibla Finder and Google Earth. Thus, this research not only carries originality in the context of verifying the qibla direction using modern technology but also plays a crucial role in ensuring that worship practices in this mosque remain in accordance with Islamic law. It is hoped that this research will not only have academic value but also significant practical implications for the local Muslim community, considering the importance of the qibla direction in maintaining the authenticity and solemnity of prayer. This verification also contributes to the preservation of the historical and religious values embraced by Masjid Jami' Nurul Huda, ensuring that the mosque continues to fulfill its primary function as a place of worship that is correct and proper.

B. Research Methodology

This research adopts a field research approach, where data is collected directly from the source and research object using a qualitative approach. Observations are conducted directly using the

Mizwala Qibla Finder instrument to determine the accuracy of the qibla direction at Masjid Jami' Nurul Huda. The research location is in Cangakan Village, Kanor District, Bojonegoro Regency, East Java Province. The primary data source utilized is data obtained through direct observation and interviews with the mosque's committee and respected village elders of Cangakan. Meanwhile, secondary data sources consist of supporting data used in the research, such as journals, books, websites, and YouTube (Nazir, 2009).

C. Results and Discussion

1. History of the Construction of Masjid Jami' Nurul Huda in Cangakan, Bojonegoro

Masjid Jami' Nurul Huda is the oldest mosque in Bojonegoro, located on the banks of the Solo River, in Cangakan Village, Kanor District, Bojonegoro. The mosque was built in 1846 AD or 1262 Hijriyah. The establishment of this mosque is inseparable from the role of Ki Ageng Wiroyudo, who was a warrior from the Islamic Mataram kingdom fleeing from the pursuit of the Dutch army at that time (Djufri, 2022). Ki Ageng Wiroyudo traversed the Solo River and settled in Kabalan Village, where he hid for a year. Later, Ki Ageng Wiroyudo built a small mosque in Cangakan Village, which was warmly welcomed by the local residents. The small mosque has now developed into a significant mosque. From interviews with the mosque's committee, it was revealed that the mosque has undergone four renovations but still retains its original style. The mosque's legacy that is still maintained to this day includes the entrance door with Javanese script motifs, on which the year of the mosque's establishment is written. Additionally, there is a sundial, an ancient timekeeping device, standing beside the mosque. There is also an estimated 342-year-old teakwood chest and a carpet that was used to welcome the arrival of President Ir. Soekarno in Bojonegoro (Hakim, 2023).

Originating from the increasing population settling in Cangakan Village, an expansion of the mosque was eventually carried out. On the right side, a women's area was built, measuring 3m x 11m, consisting of red brick walls. At the front, a veranda measuring 71/2m x 11m was built, also with red brick walls, marble floor, and carved zinc ceiling. On the southern side of the mosque, a stage room measuring 4m x 6m was erected, with a wudu pool underneath measuring 1.20m x 3m, adjacent to a bathroom on the western side measuring 4m x 4m. On the stage, made of teak wood, a teak wood kentongan (a traditional percussion instrument) and another antique wooden item made of glondong teak wood, 1m long with an approximate diameter of 1m, made in 1835, called "bedug," are placed. This "bedug" is still used by the community to this day. Masjid Jami Nurul Huda is now the pride of the people of Cangakan with its white color combined with green and gold. The mosque is capable of accommodating approximately 700 worshippers.

2. Accuracy of the Qibla Direction of of Masjid Jami' Nurul Huda in Cangakan, Bojonegoro Using Classical and Modern Instruments

Accuracy is an activity that determines the degree of closeness between the measurement results and the true results. The term "qibla direction accuracy" refers to an activity to determine the degree of closeness of the mosque's inclination measurement to the actual inclination that should face towards the Ka'bah building. Accuracy is an activity that determines the degree of closeness between the measurement results and the true results. The term "qibla direction accuracy" refers to an activity to determine the degree of closeness of the mosque's inclination measurement to the actual inclination that should face towards the Ka'bah building.

3. Qibla Direction Accuracy of Masjid Jami' Nurul Huda Using Mizwala Qibla Finder

Mizwala is a contemporary tool that combines calculations with the direction of the sun's shadow at a certain time. Mizwala Qibla Finder, in religious practice, particularly in determining the qibla direction during prayer. Mizwala Qibla Finder is a tool designed to assist Muslims in finding the qibla direction (Hosen, 2012).

Some advantages of the Mizwala Qibla Finder include: First, accuracy and precision. Mizwala Qibla Finder is designed to provide accuracy and precision in determining the qibla direction. This application uses the sun's shadow to identify the true north direction, which then points towards the Ka'bah in Mecca. In many cases, this tool requires calculation results, which also affect the level of accuracy. Second: ease of access and portability. In daily life, this tool is still considered easy to carry anywhere they go. This means they can determine the qibla direction easily without having to carry heavy equipment. Mizwala Qibla Finder is a useful tool in determining the qibla direction in the religious practice of Muslims. With ease of use, accuracy, portability, and additional features provided, this tool can be a practical companion for Muslims in performing prayer and other religious activities.

The method of using the Mizwala Qibla Finder tool to measure the qibla direction is very easy. The steps to be taken are as follows: First, before using the tool, data on the azimuth of the qibla direction is needed, and the formula for calculating the azimuth of the qibla direction is as follows (Mukarram, 2017):

a = 90 - latitude of the location

b = 90 - latitude of the Ka'bah

C = longitude of the location - longitude of the Ka'bah

$$\text{Cotan B} = \frac{cotan\ b\ X \sin a}{\sin C} - \cos a\ X \cos C$$

Cotan B = X-1 = shift tan ans = °

Since the angle result is measured from north to west, then 360 - the angle result is the value of the Ka'bah azimuth. The operation of this instrument is as follows: First, prepare the calculated azimuth of the mosque's qibla direction to be measured. Second, prepare the azimuth data of the sun using the Stelarium application. Third, open the protective box of the tool. Fourth, find a flat area. Fifth, install the stick and attach the string to the stick. Sixth, level the tool using a waterpass,

and ensure that each side of the bubble level is in the middle. Seventh, rotate the plate according to the azimuth data of the sun, which has been added by 180 degrees because the shadow is in the opposite position of the sun with the help of the string. Finally, pull the string towards the qibla azimuth, and that is the direction of the measured mosque's qibla.

If the azimuth value of the building matches the azimuth value of the qibla direction, then the mosque is aligned with the qibla direction. And if the azimuth value of the mosque does not match the azimuth value of the qibla direction, then subtract the azimuth value of the qibla direction from the azimuth value of the building to determine the inclination of the mosque. Observation of the qibla direction of Masjid Jami' Nurul Huda in this study was conducted on June 2, 2023, at 10:50 local time, with a qibla azimuth of 294°41'58.97", the azimuth of the sun's shadow at 10:50 was 192°, and the azimuth of the mosque building was 303°30'36". Therefore, the building azimuth of 303°30'36" minus the qibla azimuth has an inclination value of 8°48'37,03".

Figure 1: Measurement Using Mizwala Qibla Finder

After conducting observations and testing the accuracy of the qibla direction measurements of Masjid Jami' Nurul Huda, it was found that the deviation of the qibla direction of Masjid Jami' Nurul Huda is 8°48'37.03" inclined to the north.

4. Qibla Direction Accuracy of Masjid Jami' Nurul Huda Using Google Earth

Google Earth is one of the programs that facilitate users to view the world. With satellite imagery, users can see street sketches, buildings, maps, and information about specific locations they desire. The presence of this application greatly assists in determining various locations, including finding the correct distance and qibla direction (Kamal, 2018).

The operation or use of Google Earth can be said to be practical and easy. First, open the Google Earth Apk on the desktop and ensure that there is adequate internet signal. Pay attention to the detailed locations of the Ka'bah and the mosque building to determine the qibla direction. Then, simply add placeholders in both locations if necessary. Next, choose between the ruler tool or the

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path tool on the add toolbar. Both methods are almost similar, but if you want to determine the distance between the Ka'bah and the mosque, it is recommended to choose the ruler tool. After selecting the ruler, click on the Ka'bah building, then click on the corner of the mosque building that needs to be determined. Finally, pay attention to the angle formed by the mosque building with the line towards the Ka'bah, then the magnitude of the angle of deviation of the mosque building from the Ka'bah can be determined.

If the azimuth value of the mosque building is the same as the actual qibla direction azimuth value, then the direction of the mosque building is correctly facing the qibla direction. However, if the value of the azimuth of the mosque building differs from the actual qibla direction azimuth value, then the difference between these azimuth values can be calculated by subtracting the value of the mosque building azimuth from the actual qibla direction azimuth value. The result will indicate the inclination angle of the mosque building towards the qibla direction.

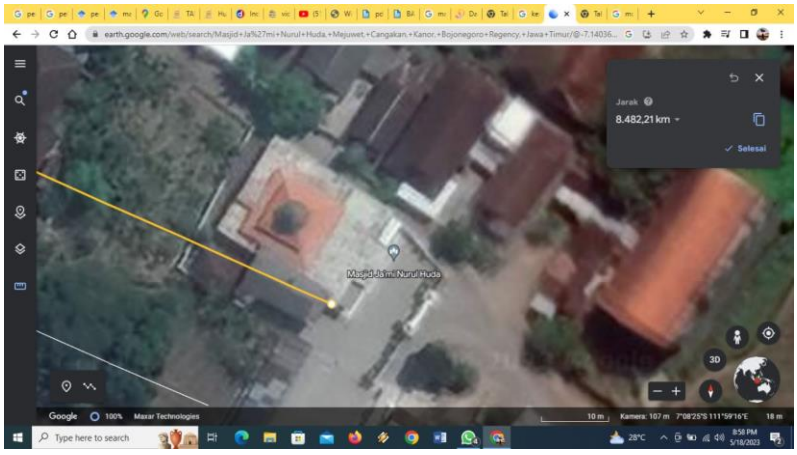

Figure 2: Qibla Direction Map of Masjid Jami' Nurul Huda on Google Earth

Astronomically, Masjid Jami' Nurul Huda in Cangakan, Kanor, Bojonegoro is located at 7°8'25" S and 111°59'16" E. Measurements using the Google Earth method show that the azimuth of the qibla direction for the position of Masjid Jami' Nurul Huda Cangakan Bojonegoro is 294°10'48" (UTSB). Meanwhile, the azimuth direction of the Masjid Jami' Nurul Huda Cangakan Bojonegoro building is 303°30'36" (UTSB). Based on these measurements, the researcher found that the deviation of Masjid Jami' Nurul Huda Cangakan Kanor Bojonegoro is approximately 9°19'48" to the north.

Table 1: Accuracy Test Results

Alat	Azimuth Kiblat	Kemelencengan
Mizwala Qiblah Finder	294°41'58,97"	8° 48'37,97" ke utara
Google Earth	294°10'48"	9°19'48" ke utara

The table above shows differences in the azimuth values and the deviation in the qibla direction measurement of Masjid Jami' Nurul Huda using two different tools. This discrepancy can be attributed to differences in the methodologies and precision of the tools. The Mizwala Qibla Finder and Google Earth employ different technologies and measurement methods. The Mizwala Qibla Finder uses measurement techniques that rely on the sun's shadow, while Google Earth utilizes advanced satellite technology and digital mapping.

D. Conclusion

Based on the previous discussions and research results, it can be concluded that the qibla direction of Masjid Jami' Nurul Huda Cangakan Bojonegoro was originally determined by local scholars or experts in Islamic astronomy using the Rubu' Mujayyab. The results from the two methods used to test the qibla accuracy show a difference in the degree of deviation between them. Measurements using the Mizwala Qibla Finder method indicated a qibla azimuth value of 294°41'58.97", while the mosque building's azimuth was 302°. Measurements using Google Earth showed that the qibla azimuth of Masjid Jami' Nurul Huda Cangakan Bojonegoro was 294°10'48" (UTSB), while the mosque building's azimuth was 303°30'36" (UTSB). Based on these measurements, it can be concluded that Masjid Jami' Nurul Huda Cangakan Bojonegoro has a deviation of 8° to the North according to the Mizwala Qibla Finder and a deviation of 9°19'48" to the North according to the Google Earth method. This indicates that an adjustment of the mosque's qibla direction is necessary to ensure that the congregation can pray more accurately and in accordance with Islamic law. This qibla adjustment will also provide a more accurate guideline for other mosques in the surrounding area, encouraging similar verification and adjustments. It is also hoped that these findings will raise awareness of the importance of periodic qibla direction verification, especially using modern technology that allows for more precise measurements. Thus, mosques can ensure that the determined qibla direction remains accurate over time and with technological advancements.

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Interview

Hakim as the mosque's committee