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Analysis of Determination and Deviation of Qibla Direction in Telaga Ngembeng Cemetery, Nyurlembang, Narmada

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Abstract: *This study aims to analyze the determination of the Qibla direction at Telaga Ngembeng Cemetery, Nyurlembang Village, Narmada District, with a primary focus on the misalignment of grave orientations caused by inconsistent Qibla determination methods. The research employs a descriptive qualitative approach with fieldwork methods, supported by Qibla direction measurements using the scientific approach of spherical trigonometry. The findings reveal varying deviations in Qibla orientation among graves, resulting from reliance on estimations by religious figures, limited access to proper instruments, inconsistent use of Qibla compasses, and the community's lack of awareness regarding the importance of directional consistency. The novelty of this research lies in the application of spherical trigonometry to recalibrate Qibla direction across a traditional cemetery with high precision. The practical implication of this study highlights the urgency of religious education and the use of accurate tools in burial practices, while the academic implication shows how integrating Islamic astronomy (falak) and socio-religious studies can improve cemetery management in line with Islamic law.*
***Keywords*:** *Qibla Direction, Cemetery, Spherical Trigonometry, Grave Misalignment*.

Abstrak: *Penelitian ini bertujuan untuk menganalisis penentuan arah kiblat di TPU Telaga Ngembeng, Desa Nyurlembang, Kecamatan Narmada, dengan fokus utama pada kemelencengan arah kiblat makam yang disebabkan oleh metode penentuan arah kiblat yang tidak konsisten. Penelitian ini menggunakan pendekatan kualitatif deskriptif dengan metode penelitian lapangan, yang didukung oleh pengukuran arah kiblat dengan menggunakan pendekatan ilmiah trigonometri bola. Hasil penelitian menunjukkan adanya variasi deviasi arah kiblat di antara makam-makam yang diakibatkan oleh ketergantungan terhadap estimasi tokoh agama, keterbatasan akses terhadap instrumen yang memadai, penggunaan kompas kiblat yang tidak konsisten, dan kurangnya kesadaran masyarakat akan pentingnya konsistensi arah kiblat. Kebaruan dari penelitian ini terletak pada aplikasi trigonometri bola untuk mengkalibrasi ulang arah kiblat di pemakaman tradisionaldengan presisi tinggi. Implikasi praktis dari penelitian ini menyoroti urgensi pendidikan agama dan penggunaan alat yang akurat dalam praktik pemakaman, sedangkan implikasi akademisnya menunjukkan bagaimana mengintegrasikan astronomi Islam (falak) dan studi sosial-keagamaan dapat meningkatkan pengelolaan pemakaman yang sejalan dengan hukum Islam.*
Kata Kunci: *Arah Kiblat, Pemakaman, Trigonometri Bola, Ketidaksejajaran Makam.*

A. Introduction

Facing the Qibla is a valid requirement for prayer, which also applies to funeral procedures in Islam.[1] In sharia, the corpse is recommended and even required to be faced towards the Kaaba, as the Prophet Muhammad ﷺ said:

الكَعْبَةُ قِبْلَتُكُم اَحْيَاء وَاَمْوَاتًا

Meaning: "*The Ka'bah is the Qiblah of both the living and the dead.*"[2]

[1]M. Nashiruddin Albani, *Fiqih Lengkap Mengurus Jenazah* (Jakarta: Gema Insani Press, 2014), hlm. 112.
[2]H.R. Abu Dawud: 2875. Dihasankan oleh syaikh al-Albani dalam *Irwa'ul Ghalil* hlm. 690.

The scholars of the Shafi'iyyah even stated that a corpse that is not facing the Qiblah must be moved as long as the condition of the body has not changed.[3] However, in practice in some traditional cemeteries, the provision of Qibla direction is often not implemented accurately. This can be caused by various factors, ranging from limited tools, minimal public understanding, to the dominance of traditional approaches that are not supported by scientific methods. One case that reflects this condition occurs in Telaga Ngembeng Cemetery, Nyurlembang Village, Narmada District, West Lombok.

Initial observations showed that the orientation of the graves in the cemetery was not parallel to each other, indicating an inconsistency in the determination of Qibla direction. Prior to 2019, the Qibla direction was determined estimatively by local religious leaders without any tools, while a Qibla compass produced by PT Kompas Ka'bah Indonesia was used thereafter. However, this tool also has limitations because it only refers to magnetic north, not true north, so deviations in Qibla direction still occur. As a result, there are significant differences in the direction of the graves, some even deviating by more than 20 degrees from the ideal Qibla direction based on spherical trigonometric calculations.

A number of previous studies have discussed the accuracy of Qibla direction and the method of determining direction based on astrology, but there are still few that highlight the phenomenon of misalignment between graves in one cemetery as an indicator of inconsistency in Qibla direction. In fact, this is important because it concerns the uniformity of the implementation of sharia in the funeral procession.

Thus, this research is present to examine more deeply the process of determining the Qibla direction at Telaga Ngembeng Cemetery, as well as identifying the factors that cause misalignment between graves. This research also aims to offer a scientific approach in the form of calibrating the Qibla direction using the spherical trigonometry method, as a solution to harmonize the religious practices of the community with the precision of the Qibla direction according to Sharia.

B. Methods

This research uses a descriptive qualitative approach with the aim of describing in detail the process of determining Qibla direction in Telaga Ngembeng Cemetery, Nyurlembang Village, Narmada Sub-district, as well as identifying factors that cause misalignment between graves.[4] The research location was chosen purposively because it was known that there were fundamental problems in the accuracy of Qibla direction and the orderliness of the rows of graves.

Data collection techniques were conducted through participatory observation, in-depth interviews, and documentation. Observations were conducted directly at the cemetery to observe the layout and direction of each row of graves. Researchers measured the direction of each grave using a digital compass and utilized the Google Earth application to record precise latitude and longitude coordinates. Semi-structured interviews were conducted with a number of key informants, namely the local religious figure (Amaq Sapiah), the dusun head who is

[3]Imam Nawawi, *Raudhatu ath-Thalibin wa Umdatul Muftin*, (Beirut: al-Maktabah al-Islamiyah, 1991), jilid II, hlm. 134

[4]Ahmad Fauzi, dkk. Metodologi Penelitian, (Purwokerto: Pena Persada, 2022), hlm. 24

responsible for the administration of the cemetery, and residents involved in the procession of exhuming and burying bodies. The interviews were aimed at exploring the understanding, customs and methods used by the community in determining the Qibla direction. The interviews were recorded and transcribed for further analysis.

The research instruments used include observation and interview guides, digital compasses, scientific calculators, and satellite-based mapping software (Google Earth). To support the validity of the measurement results, researchers calibrated the Qibla direction using the spherical trigonometry approach. To maintain the validity of the data, this research used the triangulation method, both source and method triangulation. Source triangulation is done by comparing information from various informants, while method triangulation is done by matching the results of observations, interviews, documentation, and spherical trigonometric calculations. Validation is also strengthened through clarification of the findings to local religious leaders so that the researcher's interpretation remains contextual and in accordance with the reality in the field.[5]

C. Results and Discussion

1 Determination of Qibla Direction of Telaga Ngembeng Cemetery Nyurlembang Narmada

The calculation of Qibla direction basically serves to determine where the Kaaba in Mecca can be seen from a point on the earth's surface, so that all people who are praying or people who will be buried still point right to the Kaaba.[6] The development of technology today has a positive impact on the progress of falak science, especially in determining the Qibla direction, including the development of various instruments, both classical and modern.[7] One example is the Qibla compass tool used in Telaga Ngembeng Nyurlembang Narmada cemetery as a Qibla direction determinant.

In the past, Telaga Ngembeng Nyurlembang Narmada cemetery did not use any tools in determining the Qibla direction but only used estimates from religious leaders by imagining the Qibla direction facing west because it was understood that the Qibla direction was in the west. This is done because of the geographical position of Lombok which leans to the northwest in the direction of Mecca. According to Mr. Sapiah as a kiayi at this time said, indeed from the beginning the determination of the Qibla direction of the Telaga Ngembeng cemetery was only done by estimation without using any scientific method and then over time because the graves had more and more determination of the Qibla direction was also carried out by means of the previous Qibla which was used as a reference for the Qibla direction, in this case the grave of Mr. Nur which was used as the first benchmark for the Qibla direction.[8] People used to put their full responsibility to the kiayi in the management of the corpse (in this case determining the Qibla direction of the grave). So that over time, from time to time there is a conflict between

[5]Hardani, dkk. Metode Penelitian Kualitatif dan Kuantitatif, (Yogyakarta: Pustaka Ilmu, 2020), hlm. 121-122

[6]Syafi'i, M. (2022). Akurasi Perhitungan Arah Kiblat Pulau Lombok Berdasarkan Hisab TGH. Ibrahim Al-Khalidy Kediri *Al-Afaq: Jurnal Ilmu Falak dan Astronomi, 4(2) 260-274*

[7]Muslih R. & Amir, R. (2020). Akurasi Arah Kiblat Musala Stasiun Pengisian Bahan Bakar Umum (SPBU) di Kota Makassar, *Hisabuna 1(1) 139-147*

[8]Sapiah, *wawancara,* Telaga Ngembeng 31 Agustus 2024

the old and new religious leaders, finally the village provides a tool in the form of a Qibla compass as a guide in determining the Qibla direction. Until now, starting from 2019, the determination of the Qibla direction is carried out with a Qibla compass and also continues with the help of the kiayi.[9]

Determination of Qibla direction using the Qibla compass produced by PT Kompas Kabah Indonesia works based on the same principle as a compass in general, namely the compass needle points to magnetic north. The difference lies in the compass dial numbers, which use a 40 scale instead of 360 degrees. Each number on this scale is equivalent to 9 degrees of arc. In addition, this compass is equipped with a guidebook that lists the Qibla index values for various countries, including Indonesia. To determine the Qibla direction, the compass needle is pointed to the number corresponding to the city you want to know the Qibla. With this method, the arrow (zero) on the compass automatically indicates the Qibla direction of the city.[10]

Qibla compass is an adaptation of a magnetic compass specifically designed to assist Muslims in determining the Qibla direction. This Qibla compass is produced by PT Kompas Kabah Indonesia located at Jln. Tanjung Priok 12 A, Surabaya City. Determination of Qibla direction using this compass is done based on the city index value listed in the guidebook. The guidebook provides city index codes from various countries. By pointing the compass needle to the corresponding city index number, the compass automatically shows the Qibla direction of the city. As for the components in this Qibla compass, it consists of 3 components including:[11]

a. Compass Cover

The Compass Cover, which covers the magnetic needle when the compass is not in use, serves to protect the magnetic needle from dust and dirt. On some models, the inside of the cover includes a city table or usage guide.

b. Switch Button (Function Button)

The button on this Qibla compass functions to activate or deactivate the compass and also functions to lock the measurement results so that the magnetic needle on the compass does not move in any direction because it is influenced by the magnetic field.

c. Casing (Compass Body)

The compass body is the part that houses the compass's main container such as a clear liquid that serves as a protector, both from external factors and from the risk of rust. This liquid is designed to keep the compass performance stable in extreme temperature ranges between 4˚C and 50˚C. Overall, the compass housing serves as a place to house and protect all compass components.

d. Magnetic Needle

The compass needle is one of the main components of a compass. This needle is made of magnetic material, so it naturally always points in the direction of magnetic north-south

[9]Sema'un, *wawancara,* Telaga Ngembeng 7 September 2024

[10]Aziz Zamroni, *"Uji Akurasi Kompas Kiblat Keluaran PT Kompas Ka'bah Indonesia dalam Penentuan Arah Kiblat"* (Skripsi: UIN Mataram, 2022), hlm. 20-21

[11]Aziz Zamroni, "Uji Akurasi Kompas..."

(magnetic north). In the Qibla compass produced by PT Kompas Kabah Indonesia, this needle is very sensitive to the presence of objects that contain magnets.

e. Compass Disk

The dial is the main surface of the compass. The dial of the Qibla compass produced by PT Kompas Kabah Indonesia, there are circles, lines, and arrow symbols. The lines function as dividers of the numerical scale on the compass, while the arrow symbol points to 0, which is used to indicate the Qibla direction by aligning the magnetic needle to the index number of the city you want to know the Qibla. In addition, the compass dial is also equipped with a degree disk scale, which is a division of degrees based on the cardinal system. This scale is available in various formats, such as 360° as an international standard, 6000', 6300', 6400' for military purposes, and 400 or 40 for qibla compasses. The Qibla compass made by PT Kompas Kabah Indonesia uses a 40 scale, where each number on the scale is equivalent to 9 degrees of arc.

f. Qibla Pointer

Qibla pointer is one of the core parts of the Qibla compass designed to help users directly find the Qibla direction after the azimuth number is adjusted. This Qibla pointer is shaped like an arrow and is permanent on the Qibla compass produced by PT Kompas Kabah Indonesia.

Qibla compass guidebooks list the index values used to determine the Qibla direction of various countries, including Indonesia. Cities in Indonesia generally have the same index value of 9, despite their different latitude and longitude locations. The index value of 9 in this guidebook refers to a Qibla azimuth of 279° in degrees. The calculation can also be done through conversion, namely (9×10) × (360:400) = 81°, which is the angle from north to west. To get the azimuth (from north clockwise to south-west/UTSB), the formula is 360° - 81° = 279°. Meanwhile, the angle from west to north is calculated by 90° - 81° = 9°. Since the compass uses the magnetic principle, the measurement result of the index value or north direction needs to be adjusted by the magnetic declination correction.

One of the important findings in this study is the use of Qibla compasses by the people of Telaga Ngembeng Hamlet to determine the Qibla direction of the cemetery. However, there are inaccuracies in the measurement results that stem from the limitations of the instrument, especially because the Qibla compass only shows the direction of magnetic north, not true north. The difference between these two norths is known as magnetic declination, which is the angle between magnetic north and true north that varies depending on geographical location and time.[12] In Indonesia, including Lombok Island, magnetic declination can range from -1° to +2°, and if not taken into account properly, can cause significant deviations in Qibla direction. For example, at the research location (Narmada, West Lombok), the magnetic declination value in 2024 is in the range of +0° 43'.[13]

A practical solution to overcome this discrepancy is to correct the compass reading using current magnetic declination data from geophysical agencies or websites such as www.magneticdeclination.com or the BMKG website. This correction can be done by adding or subtracting the declination value to the compass reading, depending on the relative position

[12]Yuliana, R., & Basri, M. (2020). Evaluasi Akurasi Arah Kiblat dengan Metode Astronomis dan Kompas, *Jurnal Falak dan Sains, 8(2), 33-44*

[13]Koreksi Deklinasi Magnetik. Dikutip dari www.magnetic-declination.com

of magnetic north to true north. For example, if the declination is +1°, then the compass Qibla direction needs to be corrected westward by 1° to align with the true direction towards the Kaaba. Alternatively, the spherical trigonometry-based approach offers a higher level of accuracy. This method involves mathematical calculations based on the latitude and longitude coordinates of the user's location and the coordinates of the Kaaba. The following researcher describes the use of spherical trigonometry in determining the Qibla direction including:[14]

a. Search for Kaaba latitude data, Kaaba longitude data, latitude of place, and longitude of place.
b. If the data has been obtained, then enter the formula Cotan B = (1: tan b) x sin a: sin c - cos a x (1: tan c) on the scientific calculator.
c. Then look for the values of a, b and c. to find the value of a the formula is 90 ° minus the latitude of the place, for the value of b 90 ° minus the latitude of the Kaaba and the value of c the formula is the longitude of the place minus the longitude of the Kaaba.
d. After getting the values of a, b and c then just calculate using a scientific calculator.
e. Then calculate the Qibla azimuth (UTSB value) with the formula 360° minus the Qibla direction from north to west or with the formula 270° plus the Qibla direction from west to north.
f. Calculating the closest distance to the Kaaba.
g. After all the data has been obtained, the next step is to calculate the Qibla direction at the location and then make a Qibla direction scheme.

As for the results of calibrating the Qibla direction using spherical trigonometry at Telaga Ngembeng cemetery, the following researchers detail it:

a. Known data
   Latitude of the Kaaba : 21° 25’ North
   Longitude of the Kaaba : 39° 50’ East
   Latitude of Place : -8° 35’ South
   Longitude of Place : 116° 11’ East
b. The formula used
   Cotan B = (1 ÷ tan b) × sin a ÷ sin c – cos a × (1 ÷ tan c)
c. Find the value of a, b, c
   1) 90° - (-8° 35’) = 98°35’
   2) 90° - 21° 25’ = 68°35’
   3) 116° 11’ - 39° 50’ = 76°21’
d. Calculations and results
   Cotan B = (1 ÷ tan 68° 35’) × sin 98° 35’ ÷ sin 76° 21’ – cos 98° 35’ × (1 ÷ tan 76° 21’)
   Cotan B = 0,435355698
   Tan B = 2,296972347
   B = 66,47382479
   B = 66° 28’ 25,77” N to W
   B = 23,52617521

[14]Arino Bemi Sado, Arah Kiblat Suatu Kajian Syariah dan Sains Astronomi, (Mataram: Sanabil, 2020.), hlm. 79-87

B = 23°31’34,23” W to N

B = 293,5261752

B = 293° 31’ 34,2” NESW

e. Finding magnetic declination

Because researchers use a digital compass in determining the north direction, what is obtained is magnetic north not true north. Therefore, to get the true north direction, it is necessary to find the magnetic declination of the Telaga Ngembeng cemetery area, Nyurlembang Village, Narmada District, West Lombok by calculating the Qibla direction of the Telaga Ngembeng cemetery minus the magnetic declination with the formula: Qibla direction = Q - δ magnetic. The magnetic declination obtained from the BMKG website in the Narmada area is 0° 43’.[15] So, the Qibla direction of Telaga Ngembeng cemetery = 293° 31' 34.2" - 0° 43' then the result is 292° 48’ 34.2.”

f. Calculating the closest distance to the Kaaba

Before calculating the closest distance to a location, it is necessary to first know the conversion of one degree of arc in angle units into distance in kilometers. This can be determined using the following calculation: The circumference of the Earth is 40,000 km, while the circumference of a full circle is 360°. Thus, one degree of arc is equal to 40,000 km divided by 360°. which gives 111 km. So, one degree of arc on the Earth's surface is equivalent to a distance of 111 km. To determine the closest distance between the cemetery of Telaga Ngembeng, Nyurlembang Village, Narmada Subdistrict and the Kaaba, the calculation steps are carried out as follows:

1) To the West

To determine the closest direction from the cemetery of Telaga Ngembeng, Nyurlembang Village, Narmada Sub-district to the Kaaba through the west, a simple approach can be used by subtracting the longitude of the location from the longitude of the Kaaba, then multiplying the result by 111 km. With this approach, the calculation of distance becomes easier and more practical, such as the following formula:

To the west: 116° 11’ - 39° 50’ = 76° 21’

Thus, 76° 21’ × 111 km = 8.474,85 km rounded to 8.475 km

2) To the East

To determine the closest direction from Telaga Ngembeng cemetery, Nyurlembang village, Narmada sub-district to the Kaaba via the eastern direction, use the following steps: add 180° to the difference of 180° minus the previous east direction value (before multiplying by 111 km, such as 76° 18’). The final result is then multiplied by 111 km. Here is an illustration of the calculation:

Eastward = 180° + (180° - 76° 21’) = 283° 39’

Thus, 283° 39’ × 111 km = 31.485,15 km rounded to 31.485

3) Protractor Circumference

To calculate the length of an arc circle of 360 degrees, the calculation process is done by summing the results of the west direction calculation before multiplying by 111

[15]Koreksi Deklinasi Magnetik. Dikutip dari www.magnetic-declination.com

km and the results of the east direction calculation before multiplying by 111 km. This calculation can be described as follows:

Protractor circumference = 76° 21’ + 283° 39’ = 360°

4) Nearest Direction

Based on the results of the calculation of the closest distance from the cemetery of Telaga Ngembeng, Nyurlembang Village, Narmada Subdistrict to the Kaaba through two routes, namely the west direction and the east direction, it can be concluded that the closest route from the cemetery of Telaga Ngembeng, Nyurlembang Village, Narmada Subdistrict to the Kaaba is through the west direction with a distance of 8.475 km.

g. Searching for the Direction of Telaga Ngembeng Graveyard Row

Determination of the direction of the grave row is based on the qibla azimuth of 292° 48’ 34.2”. This value is then added with an angle of 90°, resulting in 382° 48’ 34.2”. Furthermore, the result is reduced by the angle of a full circle, which is 360°, so that the final value is 22° 48' 34.2”.

Direction of tomb row = Qibla direction + 90°
= 292° 48’ 34,2” + 90°
= 382° 48’ 34,2” - 360°
= 22° 48’ 34,2”

Based on the explanation above, it is found that the Qibla direction of Telaga Ngembeng Nyurlembang Narmada cemetery is 292° 48’ 34.2” while some graves point in different directions. The following are the results of calibration using spherical trigonometry:

Table 1. Classification of Qibla direction deviation of Telaga Ngembeng cemetery

No.	Degrees	Deviation	Number of graves
1	286°	6° 48’ 34,2”	2 Graves
2	264°	28° 48’ 34,2”	4 Graves
3	297°	4° 11’ 25,8”	5 Graves
4	276°	16° 48’ 34,2”	2 Graves
5	289°	3° 48’ 34,2”	11 Graves
6	275°	17° 48’ 34,2”	1 Graves

Table 2. Calibration results of index 9 city list on Qibla compass using spherical trigonometry

No.	City	Qibla Compass	Spherical Trigonometry	Qibla Deviation	Accuracy Level
1	Bengkalis	279°	293° 14’ 37,02”	14° 14’ 37,02”	Inappropriate
2	Jakarta	279°	295° 09’ 44”	16° 09’ 44”	Inappropriate
3	Makassar	279°	292° 28’ 16,33”	13° 28’ 16,33”	Inappropriate
4	Malang	279°	294° 12’ 45,13”	15° 12’ 45,13”	Inappropriate
5	Medan	279°	292° 44’ 27,42”	13° 44’ 27,42”	Inappropriate

6	Padang	279°	294° 41’ 8,03”	15° 41’ 8,03”	Inappropriate
7	Pontianak	279°	292° 44’ 17,21”	13° 44’ 17,21”	Inappropriate
8	Semarang	279°	294° 30’ 39,38”	15° 30’ 39,38”	Inappropriate
9	Surabaya	279°	294° 02’ 49,41”	15° 02’ 49,41”	Inappropriate

Table 3. Calibration results with magnetic declination

No.	City	Qibla Compass	Spherical Trigonometry	Qibla Deviation	Accuracy Level
1	Bengkalis	279°	293° 16’ 32,85”	14° 16’ 32,85”	Inappropriate
2	Jakarta	279°	294° 38’ 28,76”	15° 38’ 28,76”	Inappropriate
3	Makassar	279°	291° 53’ 30,75”	12° 53’ 30,75”	Inappropriate
4	Malang	279°	293° 27’ 27,67”	14° 27’ 27,67”	Inappropriate
5	Medan	279°	293° 09’ 32,54”	14° 09’ 32,54”	Inappropriate
6	Padang	279°	294° 50’ 40,14”	15° 50’ 40,14”	Inappropriate
7	Pontianak	279°	292° 25’ 42,56”	13° 25’ 42,56”	Inappropriate
8	Semarang	279°	293° 48’ 32,92”	14° 48’ 32,92”	Inappropriate
9	Surabaya	279°	293° 20’ 2,17”	14° 20’ 2,17”	Inappropriate

Based on this explanation, it can be concluded that from the beginning, the determination of the Qibla direction at Telaga Ngembeng cemetery only used estimates, but because there was a dispute by religious leaders because they did not agree with the determination of the Qibla direction by estimation, finally the village provided a compass tool made by PT Kompas Ka'bah Indonesia in 2019. The use of the Qibla compass in Telaga Ngembeng cemetery is carried out by the head of the hamlet but the intervention of the kiayi remains, meaning that the kiayi still has a role in determining the Qibla direction of the tomb which will be used as the final decision. After the researcher calibrated the qibla compass used, it turned out that it was not accurate. The direction determined using the Qibla compass leads to an azimuth of 279º while with spherical trigonometry the azmiuth of the Qibla leads to 293º then reduced by the magnetic declination in the Narmada region which is 0º 43' to 292º, so that the obliquity of the Qibla direction of the PT. Kompas Ka'bah Indonesia Qibla compass is 13º.

A comparison between the compass and spherical trigonometry methods shows that although the Qibla compass is easier to use, its accuracy is highly dependent on the user's ability to correct for magnetic declination. In contrast, spherical trigonometry, while requiring more complex calculations, provides consistent and accurate results.[16] Therefore, the use of spherical trigonometry based methods is highly recommended, especially in determining permanent Qibla directions such as for mosque construction or cemetery landscaping.

[16]Al-Rashid, A., & Ma’ruf, M. (2021). Analisis Perbandingan Metode Kompas dan Trigonometri, *Jurnal Ilmiah Al-Falah, 22(1), 45-60*

2 Factors of Obliquity in Qibla Direction of Telaga Ngembeng Nyurlembang Cemetery, Narmada

The factors of the cemetery's Qibla direction can be categorized into two categories: internal factors and external factors. The following is the explanation:[17]

a. Internal Factors

1) How to Determine Qibla Direction

The determination of Qibla direction in Telaga Ngembeng Cemetery, Nyurlembang, Narmada is often done only based on estimation, by referring roughly to the Qibla direction of a pre-existing grave. Unfortunately, the graves used as references do not always have the right Qibla direction. As a result, when a new grave is dug, the Qibla direction tends to follow the nearest grave that was built first. This reliance on earlier graves poses a risk, especially if the Qibla direction of the early graves is incorrect. This error then repeats and spreads to subsequent graves, resulting in more and more graves that are not aligned with the correct Qibla direction.

The situation is further complicated when the location of a new grave is far from an existing row of graves. In such cases, the local religious leader, or kiayi, will determine the Qibla direction by facing the general northwest direction, without using accurate mathematical calculations or technology. Although this method is based on long-standing practice, without precise calculations, there is a risk of deviating from the Qibla direction. Thus, although Qibla direction determination is considered a simple process, small errors in the initial steps can have a major impact on the accuracy of the Qibla throughout the entire cemetery.

2) Tool Limitations

The limitations of the tools used in determining the Qibla direction is one of the significant internal factors for the Qibla direction deviations in Telaga Ngembeng Cemetery, Nyurlembang, Narmada. In practice, the local community tends to rely on simple tools or even just based on eye observation and intuition in determining the Qibla direction, especially in the period before the use of compasses and modern technology became common.

The absence of modern tools such as theodolites or satellite based Qibla determination applications is also an obstacle. When Qibla direction is determined using only a simple compass, kiayis or local religious leaders often rely on such equipment without considering the potential for magnetic field errors or inaccuracies in compass readings. In some cases, the earth's disturbed magnetic field or the poor quality of the compass can increase the degree of deviation in Qibla direction.

In addition, people’s lack of understanding of how more accurate modern tools work also affects the results of Qibla determination. Although compasses have begun to be used, without an in-depth understanding of the techniques used, errors are still possible. This indicates that the limitations of tools, both in terms of type and use, play a major role in creating the Qibla direction skew in this cemetery. These tool limitations show that the practice of Qibla direction determination at Telaga Ngembeng Cemetery is not a problem solely caused by a lack of awareness of the importance of Qibla accuracy, but is also influenced by the limited means available and insufficient knowledge of more advanced technology.

[17]Sapiah & Sema’un, *Wawancara.*

3) Lack of Knowledge on the Importance of Qibla Direction

The lack of knowledge about the importance of Qibla direction is one of the main internal factors contributing to the misalignment of Qibla direction in Telaga Ngembeng Cemetery, Nyurlembang, Narmada. Although Qibla is an important element in Islamic religious practices, including in the burial of the dead, some people in this area do not fully understand the urgency of the accuracy of the Qibla direction itself. This can be seen from the habit of people who often assume that as long as the grave points to the northwest as a general estimate of the Qibla direction, it is considered sufficient.

This lack of awareness of the importance of accuracy has led people to rely more on tradition or guidance from pre-existing graves, without further checking the accuracy of the Qibla direction. They tend to follow the direction of old graves or entrust it entirely to the local kiayi, who although respected, often uses only simple methods in determining the qibla. As a result, if the Qibla direction of the reference grave is off, new graves will also follow the deviation, creating a chain of errors that are difficult to correct.

The limited knowledge of the importance of Qibla direction accuracy is also caused by the lack of access to modern information and technology. Many do not realize that with more accurate tools, such as GPS-based applications or theodolites, Qibla direction can be determined with greater precision. Even when tools such as compasses are introduced, many communities still do not understand their proper use, as in local traditions, Qibla determination is more often considered a simple ritual, without much consideration of the technical or scientific aspects behind it.

The lack of education or counseling on the importance of Qibla accuracy means that people do not feel the urgency to improve the way they determine the Qibla. Most are still of the view that as long as burials are carried out according to the correct customs and rituals, a slightly off Qibla direction is not considered a major problem. In fact, from a religious perspective, the accuracy of Qibla direction has a very important meaning, because it connects worship, including in the case of burial, with the center of the Qibla of Muslims throughout the world, namely the Ka'bah in Mecca. Therefore, the lack of knowledge about the importance of Qibla direction plays a major role in the occurrence of Qibla direction deviations at Telaga Ngembeng Cemetery. To overcome this, more effort is needed to educate the local community about the importance of Qibla accuracy, both through religious counseling and by introducing technology that can help them ensure that the Qibla direction determined is truly in accordance with religious guidance.

b. External Factors[18]

1) No Qibla Direction

The absence of a clear Qibla direction in Telaga Ngembeng Cemetery, Nyurlembang, Narmada is one of the external factors that contribute to the skewed Qibla direction in the cemetery. In the practice of burial in this location, people often do not have a guide or physical marker that can be used as a reference to determine the Qibla direction accurately. This condition causes them to rely on traditional methods or follow the qibla of the nearest grave, which is not necessarily correct.

[18] Sapiah & Sema'un, *Wawancara.*

Over time, without a permanent Qibla marker, such as a stone or Qibla monument, the process of determining the Qibla direction became increasingly difficult to ascertain. The cemetery is also not equipped with signboards or other facilities that can help the community or gravediggers determine the exact Qibla direction. As a result, every time a new grave is dug, the direction of the grave depends heavily on the estimation or interpretation of the person in charge, who is usually the local kiayi or religious figure. If the qibla direction of an existing grave is off, new graves will continue to follow the error, as there is no guideline that can validate whether the qibla direction used is correct or not. In addition, the cemetery's location in an area with uneven terrain and many large trees also adds to the challenge of ensuring accurate Qibla direction. Vegetation growing around the cemetery, such as large trees, often obscures the view and prevents the digging of graves in the ideal orientation. In the absence of Qibla direction, people often dig graves where it is most convenient, rather than where the Qibla direction is most appropriate.

The absence of Qibla markers also shows a lack of intervention from outside parties, such as religious institutions or relevant authorities, who should be able to provide facilities or assistance to ensure Qibla accuracy in public cemeteries. If there were Qibla markers installed in the cemetery, people would have a clearer reference and would not have to rely on guesswork, minimizing the risk of Qibla deviations.

This condition illustrates that the absence of clear Qibla direction is a significant external problem, which plays a role in creating uncertainty and deviations in Qibla direction at Telaga Ngembeng Cemetery. To overcome this problem, proactive measures are needed, such as the installation of permanent Qibla markers and counseling on the importance of determining accurate Qibla direction for the local community. With clear guidance, errors in Qibla direction determination can be minimized, and graves will be more in line with Islamic guidance.

2) Inconsistency in Tool Use

One of the reasons for this inconsistency is the lack of access to accurate and easy-to-use Qibla determination tools. Although a compass is a common and relatively affordable tool, not all people own or are able to operate it properly. Even when a compass is available, it is often used without regard to other factors such as the earth's magnetic field or proper calibration of the device. This causes the qibla measurement results obtained to vary depending on who is doing the measuring and how well they understand how the tool works. There is also a high reliance on kiayi or local religious leaders to determine qibla direction. When kiayis use modern tools such as compasses, the results may be more accurate, but in many cases, qibla direction determination is still done manually, based on their understanding which often draws more on tradition than on science This inconsistency causes the results of Qibla determination to vary from tomb to tomb, depending on the methods and tools used at the time.

Furthermore, there is no fixed standard or procedure that requires the use of a particular tool in determining Qibla direction in this cemetery. When people are not encouraged or required to use the same tools, the freedom in choosing methods and tools makes the orientation of graves vary. Some graves may be made with precision, but others may be off, because the tools or methods used are inconsistent. This inconsistency in tool use is further complicated by the difficult environmental conditions of the cemetery, such as hilly terrain and dense vegetation, which can hinder access to optimal use of modern tools. Magnetic field disturbances

in certain areas can also cause the compass to not function properly, so people sometimes fall back on traditional methods that are less accurate.

As such, this lack of uniformity in tool use poses a serious challenge in ensuring the accuracy of Qibla direction at Telaga Ngembeng Cemetery. To minimize Qibla deviations, efforts are needed to promote consistent and accurate tool use throughout the burial process. The provision of adequate tools, accompanied by training on how to use them correctly, could be a solution to ensure that every grave in the cemetery is oriented in the proper Qibla direction.

D. Conclusion

This research highlights the importance of determining the exact Qibla direction in Telaga Ngembeng Cemetery, Nyurlembang Village, Narmada Sub district. Based on the analysis conducted, it was found that the traditional methods that have been used, such as estimation by referring to previous graves, are the main cause of the Qibla direction deviations. Since 2019, the use of Qibla compasses has been introduced as an effort to improve accuracy. However, this tool still has limitations as it relies on magnetic north instead of true north.

The factors that cause the Qibla direction to deviate are divided into internal and external factors. Internally, the lack of public knowledge, limited tools, and reliance on traditional methods exacerbate the deviation of Qibla direction. Meanwhile, externally, the absence of permanent Qibla markers in cemeteries and changes in topography due to earthquakes also affect the accuracy of Qibla direction.

The results of measurements with spherical trigonometry show that the ideal Qibla direction in this cemetery is 292° 48' 34.2". However, in reality many graves have deviations of up to 28° 48' 34.2", indicating the need for more serious efforts in improving Qibla direction determination in the future.

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