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Facing Interdisciplinary Research In Syariah Researches, Findings From Applied Falak Sience

Fattah Setiawan Santoso
Universitas Cokroaminoto Yogyakarta Indonesia
e-mail: fsanto20 gmail.com
Muthmainnah
Universitas Cokroaminoto Yogyakarta Indonesia
e-mail: inna.faiz@gmail.com
Cipto Sembodo
Universitas Cokroaminoto Yogyakarta Indonesia
e-mail: c.sembodo@gmail.com
Subary
Universitas Cokroaminoto Yogyakarta Indonesia
e-mail: subariahmad33@gmail.com
Muhammad Nur Kholis Al Amin
UIN Raden Mas Said Surakarta Indonesia
e-mail: nurkholis.alamin@staff.uinsaid.ac.id
Nur Alfan Baheem
Princess of Naradhiwas University Thailand
e-mail: na.baheem@pnu.ac.th
Paseeyah Baka
Ma'had Al-Bitsat Ad-Diniyyah Yala Thailand
e-mail: faizah.121@outlook.com

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Abstract
This working paper aims to describe the use of interdisciplinary studies in the application of Sharia, especially Islamic astronomy (Ilmu Falak). The benefit is strengthening holistic insight in applying Islamic astronomy in everyday life. This broadening of insight is assisted by the study of exact sciences which can scientifically impact the accuracy of astronomical calculations. Through a literature review, it can be found that interdisciplinary research in Sharia, especially astronomy in determining the direction of the Qibla, cannot avoid the use of science and technology that is currently developing to strengthen its fiqh norms.
Keywords: Ilmu Falak, science, technology, interdisciplinary

Abstrak
Kertas kerja ini bertujuan untuk mendeskripsikan pemanfaatan kajian interdisipliner dalam penerapan syariah khususnya astronomi Islam (Ilmu Falak). Manfaatnya adalah memperkuat wawasan holistik dalam menerapkan ilmu astronomi Islam dalam kehidupan sehari-hari. Perluasan wawasan ini dibantu dengan kajian ilmu-ilmu eksakta yang secara ilmiah dapat berdampak pada keakuratan perhitungan astronomi. Melalui tinjauan pustaka dapat diketahui bahwa penelitian interdisiplin ilmu syariah khususnya astronomi dalam menentukan arah kiblat tidak bisa lepas dari

pemanfaatan ilmu pengetahuan dan teknologi yang berkembang saat ini untuk memperkuat norma-norma fiqhnya.

Kata Kunci: Ilmu Falak, sains, teknologi, interdisipliner

Introduction

Nowadays, interdisciplinary research has been bridging disciplines have much to teach regarding how to combine analytical tools to tackle problems and questions that cross traditional disciplinary boundaries [1]. The development of science and technology has an important influence on every element of society, from children to adults and even the elderly. Thats also participates in changing the habits of daily life patterns starting from lifestyle, and interactions, especially in the world of education, social skills, religion and so on.[2]

It considers the fallacy of nomothetic claim as well as the fruitful production of solutions by viewing process (methodology), not domain (academic turf), as the key to interdisciplinary success. Staking claim to interdisciplinarity is shown to be unproductive while finding the need for interdisciplinary approaches and following the mandates of that need strengthens both the disciplines and interdisciplinary studies interdisciplinary approaches and following the mandates of that need strengthens both the disciplines and interdisciplinary studies.[3]

Interdisciplinary research is the synergistic combination of two or more disciplines to achieve one research objective. Interdisciplinary research integrates research methods, knowledge, assumptions, and frameworks from separate disciplines to address a shared research question. Another categories are intradisciplinary, multidisciplinary, cross-disciplinary, anda transdisciplinary. Within intradisciplinary research, investigators use

[1] Dawn Youngblood, "Interdisciplinary studies and the bridging disciplines: A matter of process," *Journal of Research Practice* 3, no. 2 (2007): 1–8.

[2] Aarti Sharma et al., "Education Reform: Role of Social Media in Education," in *2021 International Conference on Computational Performance Evaluation (ComPE)*, 2021; Fattah Setiawan Santoso et al., "The Future Of Islamic Law Studies At Indonesia Islamic Higher Education," in *Proceeding of Annual International Conference on Islamic Education and Language (AICIEL)*, 2023, 622–28.

[3] Keisuke Okamura, "Interdisciplinarity revisited: evidence for research impact and dynamism," *Palgrave Communications* 5, no. 1 (2019): 1–9, https://doi.org/10.1057/s41599-019-0352-4.

norms within a single discipline to address research questions applicable to that discipline. Multidisciplinary research draws on knowledge from different disciplines but stays within their borders providing various perspectives to address complex, real-world problems. Cross-disciplinary research involves using single disciplinary methods and assumptions to cross borders to address questions about a topic outside the scope of the discipline without any integration from other disciplines. And transdisciplinary research occurs when ideas from a discipline(s) offer insights that transcend the discipline's traditional borders.[4]

Its use is also recommended in Sharia, especially the science of Falak. There is a great need for this knowledge to be strengthened with other scientific research so that its application can satisfy the faith and piety of the people.[5] Like implementing one of the pillars of Islam, namely salat (prayer). The obligation to worship during these five times, apart from punctuality.[6] is to face the direction of the Qibla. Performing prayers in a deviated or opposing direction can be invalidated. The legal basis is the Koran in Surah Al-Baqarah (2: 149-150)[7]. The face of prayer has undergone changes along with the Israk Mikraj incident where the prayer direction changed direction to the Kaaba until now.[8] In the early days of the obligation, prayers still faced Palestine, namely the Al Aqsa Mosque. Sudibyo has explained the history of the first Qibla direction, namely Baitul Maqdis. Baitul Maqdis was the main part of the Prophet's journey to Sidrat al-Muntaha during Israk and Mikraj. At that time, Muhammad saw. had time to pray two rak'ahs with Prophets Ibrahim, Moses and Isa before climbing the stairs fixed on the stone of Jacob to the seventh heaven.[9]

From the Islamic school of jurisprudence, Imam Syafi'i explained the obligation to face the Kaaba when performing the five obligatory prayers or sunnah, both for people

[4] Kristy L. Daniel et al., "Challenges facing interdisciplinary researchers: Findings from a professional development workshop," *PLoS ONE* 17, no. 4 April (2022): 1–16, https://doi.org/10.1371/journal.pone.0267234; Gemma Carr, Daniel P. Loucks, dan Günter Blöschl, "Gaining insight into interdisciplinary research and education programmes: A framework for evaluation," *Research Policy* 47, no. 1 (2018): 35–48, https://doi.org/10.1016/j.respol.2017.09.010.

[5] Imratun dan Fattah S. Santoso, "Integration Of Revelation And Social Sciences In The Study Of The Quran And Hadith," in *SEMINAR ANTAR-UNIVERSITI PENGAJIAN LEPAS IJAZAH 2021 (SAPLI 2021)*, ed. oleh Muhammad Syahirul Syafiq Bin Rashid, 2021, 491–97.

[6] Muthmainnah, "Transformasi Koordinat Bola Langit Ke Dalam Segitiga Bola (Equatorial Dan Ekliptika) Dalam Penentuan," *Ulumuddin: Jurnal Ilmu-ilmu Keislaman* 5, no. 2 (2015): 11–23.

[7] Nurul Arifin, "Integrasi Teks-Teks Syar'i Yang Terkait Dengan Arah Kiblat Dalam Konteks Astronomi," *Elfalaky Jurnal Ilmu Falak* 4, no. 73–92 (Juni 2020), https://doi.org/10.24252/ifk.v4i1.14169; RI, *Al-Quran dan Terjemahannya* (Jakarta: Kantor Kementerian Agama, n.d.).

[8] Muthmainnah, "Kiblat Dan Kakbah Dalam Sejarah Perkembangan Fikih," *Ulumuddin: Jurnal Ilmu-ilmu Keislaman* 7, no. 1 (2017): 1–16; Ma'rufin Sudibyo, *Sang Nabi pun Berputar, Arah Kiblat dan tata caranya pengukurannya* (Solo: Tinta Media, 2015).

[9] Sudibyo, *Sang Nabi pun Berputar, Arah Kiblat dan tata caranya pengukurannya*.

close to him and people who are far from him, which is located in the city of Mecca, Saudi Arabia. If he can know the exact direction of the Kaaba itself, then he must face that direction. For those who cannot be sure, an estimate will suffice.[10]

The Kaaba is an ancient box building also known as Baitullah. Over time, the Kaaba has undergone many renovations without losing its original shape for the sake of preservation. In the early days of the Islamic revival, the Quraysh community renovated the building and subsequent generations continued to maintain it so that its integrity as a direction of prayer for Muslims around the world could still be ensured.[11]

Historically, Azhari has experienced quite significant developments in determining the Qibla direction in Indonesia.[12] This is necessary considering the distance from the Kaaba is very far. It is necessary to measure precisely and accurately to avoid deviations. This effort is intended to ensure that the direction of prayer remains in accordance with the propositions of the Koran Hadith and the study of astronomy and astronomy.[13]

Its development has been going on since the early era of Indonesia's modern period during Dutch colonialism, but its development has been gradual and what stands out is the use of modern technology and science. Among them are miqyas, rubu' mujayyab, or Istiwak sticks. Other common technologies are compasses or theodolites. The use of science is increasingly widespread, especially in collecting coordinate data including measuring applications. All of this has spurred the development of increasingly accurate techniques for estimating the Qibla.[14]

The classic method that is still often used to determine the direction of the Qibla is using azimuth and rasyd a-qiblah. The first is in the form of a line indicating the direction of the Kaaba, while the other method is based on when the sun is directly above the Kaaba [15]. Another way is suggested to first understand the two terms of place data, namely place latitude and place longitude.[16] Others consider that the use of the Google Earth application

[10] Khafid, "Ketelitian Penentuan Arah Kiblat" (2019).

[11] Murtadho, *Ilmu Falak Praktis* (Malang: UIN Malang press, 2018).

[12] Susiknan Azhari, *Ilmu Falak Perjumpaan Khazanah Islam dan Sains Modern* (Yogyakarta: SM, 2017); Muthmainnah Muthmainnah, "Falak dan ilmu yang Berkaitan Dengannya," *Ulumuddin : Jurnal Ilmu-ilmu Keislaman: Jurnal Ilmu-ilmu Keislaman* 6, no. 1 (2016): 49–59.

[13] Zainul Arifin, "Toleransi Penyimpangan Pengukuran Arah Kiblat," *Elfalaky Jurnal Ilmu Falak* 2, no. 1 (Juni 2018): 62–75, https://doi.org/10.24252/IFK.V2I1.14159.

[14] Maskufa, *Ilmu Falaq* (Jakarta: Gaung Persada, 2019).

[15] Ahmad Izzuddin, *Ilmu Falak* (Tangerang: CV. IPA ABONG, 2006).

[16] Muhyiddin. Khazin, *Ilmu Falak dalam Teori dan Praktik* (Yogyakarta: Buana Pustaka, 2014).

is also effective and efficient in qibla accuracy. [17] Even Indonesian scientists have discovered an easy and cheap technique, namely the right triangle method.[18]

It turns out that this development still may not be able to move some Indonesian ulama and Muslim communities to use modern science and technology in measuring the accuracy of the prayer Qibla. This condition also has an impact on astronomy education, which is still dominated at the tertiary level. They still stick to what has been previously established even with simpler technology as it is.[19] They also did not consider the potential for land movement or shifting that might occur over time so that a shift in the Qibla could occur.

This literature study will focus on the history of the development of the use of science and technology in calculating the accuracy of Qibla direction and underline its use as a learning medium for ilmu Falak in higher education. The benefit is that it strengthens efforts to reduce debate about technological methods and tools, including scientific methods, and is useful for accuracy in all focuses of Islamic astronomical studies. [20] Excessive pros and cons in astronomy, especially the accuracy of the Qibla in a mosque, can lead to unrest and commotion between congregations.[21]

Method

This study of the use of interdisciplinary research in the application of astronomy will focus on the history of the development of the use of exact sciences and modern technology in calculating the accuracy of Qibla direction in Indonesia and identify the reasons for those who reject it. Data collection relies entirely on literature review so that library research uses books, scriptures, journals or working papers that are relevant to the core research object as the data source. The collected data is then analyzed through content analysis.

[17] Zainul Arifin, "Akurasi Google Earth Dalam Pengukuran Arah Kiblat," *Ulumuddin : Jurnal Ilmu-ilmu Keislaman* 7, no. 2 (19 Desember 2017): 137–46, https://doi.org/10.47200/ulumuddin.v7i2.196.

[18] Slamet Hambali, "Metode Pengukuran Arah Kiblat dengan Segitiga Siku-Siku dari Bayangan Matahari Setiap Saat," (IAIN Walisongo Semarang, 2010).

[19] Mushoddik Daulay, Hartono Hartono, dan Sunaryo Ishaq, "Akurasi Arah Kiblat Masjid Di Kecamatan Bekasi Barat," *Jurnal Geografi Edukasi dan Lingkungan* 1, no. 1 (Juli 2017): 7–18, https://doi.org/10.29405/JGEL.V1I1.452.

[20] Mohd Kalam Daud dan Ivan Sunardy, "Pengukuran Arah Kiblat Menggunakan Alat Modern menurut Perspektif Ulama Dayah (Studi Kasus di Kabupaten Pidie)," *El-USRAH: Jurnal Hukum Keluarga* 2, no. 1 (Agustus 2019): 1, https://doi.org/10.22373/ujhk.v2i1.7639.

[21] Ngamilah Ngamilah, "Polemik Arah Kiblat dan Solusinya dalam Perspektif al-Qur'an," *Millati: Journal of Islamic Studies and Humanities* 1, no. 1 (Juni 2016): 81–102, https://doi.org/10.18326/mlt.v1i1.81-102.

Research Results and Discussion

Linguistically, Qibla is derived from Arabic, Qiblah. The same terms are jihah and shatrah. In Indonesian it is known as direction and azimuth in Latin. [22] In terms of terminology, the Qibla is the obligatory direction to go when Muslims perform prayers. [23] There are two meanings left in it. First, 'ain al-ka'bah which is located in the Kaaba itself. Jihah al-Ka'bah is the second meaning which is the closest distance along the circle that passes the Ka'bah to the relevant place. The first understanding can be received when prayers are performed around the Grand Mosque, the exact location of the Kaaba. Meanwhile, the second meaning makes it easier for Muslims who are outside the mosque area and cover areas of the world.

Technological tools that can help with measurements at the third level have become much different from before. Specially made istiwa' and rubu' mujayyab' sticks or using directional compasses and theodolites which are commonly used in measuring land and buildings are often involved. The calculation process is not limited to calculating paper, both regarding coordinate data and measurement systems which are greatly helped by the existence of tools such as scientific calculators and increasingly sophisticated coordinate data search tools such as GPS (Global Positioning System).[24]

The development of technology such as theodolites to measure the Qibla direction today is something that must be appreciated because the direction to the Qibla can be measured precisely and accurately. Jayusman has described a comparison of the technological accuracy of astronomical equipment. [25]

Table 1

Technology and Qibla Accuracy Level

No	Instruments	Accuracy
1.	Istiwak	Accurate for determining true west and east directions. When used to determine the direction of the Qibla, of course it must be assisted by Rubu' Mujayyab or compass.

[22] Jayusman Jayusman, "Akurasi Metode Penentuan Arah Kiblat: Kajian Fiqh Al-Ikhtilaf Dan Sains," *Asas Jurnal Hukum Ekonomi Syariah* 6, no. 72–86 (Februari 2014), https://doi.org/10.24042/ASAS.V6I1.1273; Thomas Djamaluddin dkk., *Hisab Rukyat Di Indonesia Serta Permasalahannya* (Jakarta: Badan Meteorologi Klimatologi dan Geofisika, 2010).

[23] Muhammad Syata Abu Bakar Ad-Dimyati, *I'anah at-Talibin* (Beirut: Dar al-Fikr, 2002); Mutmainnah Mutmainnah, "Kiblat Dan Kakbah Dalam Sejarah Perkembangan Fikih," *Ulumuddin : Jurnal Ilmu-ilmu Keislaman* 7, no. 1 (14 Juni 2017): 1–16, https://doi.org/10.47200/ulumuddin.v7i1.180.

[24] Azhari, *Ilmu Falak Perjumpaan Khazanah Islam dan Sains Modern*.

[25] "Akurasi Metode Penentuan Arah Kiblat: Kajian Fiqh Al-Ikhtilaf Dan Sains."

2. Compass	Use a compass that has high accuracy, keep it away from metal because it can affect the compass's magnetic field, and correct the magnetic declination, so the results will be accurate.
3. Razor blade or sewing needle	The directions indicated by the razor blade and sewing needle are the magnetic north and south directions, not the earth's north and south directions. So relying on this direction is not accurate.
4. *Rashd al-qiblah* global	Accurate
5. *Rashd al-qiblah* local	Accurate. It is best to use the local rashd al-qiblah time in the morning or evening (not when the sun is near the celestial meridian because at that time the sun's movement is "faster". This condition is vulnerable to determining the direction of the Qibla).
6. Theodolit	Accurate

Even though there are several weaknesses in science and technology, this could actually be an encouragement for astronomical science tools and technology to continue to develop, undergo updates and adapt to needs. However, the possibility that the ulama's and society's acceptance of this development will not move in unity is becoming clearer. Among them there are certainly those who accept it as a solution, but there are also others who reject it for various reasons.

This is because the various perspectives of Indonesian people regarding the direction of the Qibla are still acceptable. In general, they are based on the Qibla direction in mosques, namely facing west as in the MUI Fatwa. Because it has continuously received criticism from a number of institutions, the MUI issued fatwa number 5/2010 in August 2010 which was seen as a revision of fatwa number 3/2010. In fatwa number 5/2010 it is stated that the Qibla direction in Indonesia is to the northwest according to the latitude and longitude of each place. Even though the fatwa was revised, this fatwa still has remaining problems because the old fatwa was not cancelled, so there are two fatwas whose dictums contradict each other and are declared to be equally effective. For some people, this revised fatwa gives rise to the opinion that the Qibla direction has really changed from being west to northwest.[26]

If the Qibla direction in the MUI fatwa is re-measured from a geographical perspective, the direction west of Indonesia points towards Africa. Thus, they still understand that the west is the direction of the Qibla that has been passed down from generation to generation, so that some people are confused as to why change is needed.

[26] Ngamilah, "Polemik Arah Kiblat dan Solusinya dalam Perspektif al-Qur'an."

"Didn't our ancestors also do this, but now why are the foxes doing it? Did you not respect our teachers or clerics in the past, was this not considered to be of good quality to them?"

There it was also not considered that the Qibla in Indonesia had shifted 30 cm to the right of the actual direction of the Qibla as a result of earthquakes and shifting tectonic plates. This fatwa of course sparked controversy from various groups, especially astronomy experts. Some Muslims welcomed this fatwa, especially those who did not agree with re-measuring the direction of the Qibla in any way. But some others think that the direction of the Qibla is not the result of objective science, some others are also confused by this fatwa considering that at the same time officials from the Indonesian Ministry of Religion in various places and a number of related institutions such as astronomical institutions, Islamic universities and religious courts aggressively socialize the direction of the Indonesian Qibla and procedures for measuring it.

This is a problem that arises currently, not many people know how to actually determine the correct, accurate and thorough calculation of the direction of the Qibla. They are still unfamiliar with this part of the study of astronomy.

Rejection is based more on belief in ijtihad from previous kyai and ulama with the argument that technology is not the only solution to problems because direction can be determined in a traditional way with simple tools. And they are of the opinion that it is impossible for clerics at the level of saints who were respected throughout time in ancient times to create the mosque in the wrong direction of the Qibla, they were people who were experts from their time and from generation to generation. They are not just any clerics, they have knowledge or other advantages apart from the religious field, so their taqlid is very high, so they reject the mosque/prayer room without having to change the direction of the Qibla, the direction cannot be wrong, it is definitely right. For example, the phenomenal Demak mosque, after measurements were taken with a theodolite, it turned out that it had shifted up to 2 degrees in a less precise direction towards the Qibla.[27]

However, the kyai there strongly rejected this measurement and the Demak mosque still cannot change its Qibla direction. This party even forbids repeat measurements.[28] Muthoha concluded that public confidence in the views of previous ulama was very high, which made improving the direction of the Qibla in Demak very complicated.[29] Zaini et al. also found the same thing when researching people's

[27] Arifin, "Toleransi Penyimpangan Pengukuran Arah Kiblat."

[28] Ila Nurmila, "Aplikasi Metode Azimuth Kiblat Dan Rashdul Kiblat Dengan Penggunaan Rubu' Mujayyab" (UIN Walisongo, 2012).

[29] Muthoha Arkanuddin, "Perhitungan dan pengukuran Arah kiblat" (2007).

perceptions of changes in the direction of the mosque's Qibla in one of the villages in Bantul district.[30]

Conclusion

Learning Ilmu Falak, especially determining the Qibla direction in universities in Indonesia, cannot be separated from the use of technology that is developing today. So, Its interdisciplinary study. Like a theodolite, this tool is also commonly used by geodesists and geologists, but its use can be extended to measuring the direction of the Qibla. The method is after measuring it using the rasyd al-Qiblah method or the sun's shadow when in Mecca. Theodolite is then used to validate it. It turns out that modern science and technology can be accepted by some groups. However, there are those who think that the direction of Indonesia's Qibla is west so that the direction of mosques and prayer rooms does not need to change, which of course actually causes unrest. Despite the fact that mosques in Indonesia face west, they do not actually face the Kaaba in proper ijtihad.

There is something that needs to be emphasized that every era will experience several advances in science and technology. In the past, equipment to help calculate Qibla direction was still very simple and limited. Public insight into Ilmu Falak is also limited. Now times have changed where science and technology can be useful in calculating distances and determining the direction of the Kaaba in the city of Mecca and various countries in the world that can be calculated using astronomy. So Ilmu falak lectures in universities should slowly follow technological developments to produce more precise and accurate calculations and measurements in facing the direction of the Qibla in Mecca. Cultivating this awareness of ilmu Falak as interdisciplinary study, requires continuous socialization from various related parties in formal and informal education till higher education.

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[30] Hendrifalak Hendrifalak, Zainul Arifin, dan Muhamad Ulin Nuha, "Google Maps: Maqashid Syariah Study On How To Dtermine The Direction Of Comtemporary Qibla," *Elfalaky: Jurnal Ilmu Falak* 7, no. 2 (1 Desember 2023): 175–94, https://doi.org/10.24252/IFK.V7I2.42274.

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