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BETWEEN IDEALS AND CHALLENGES OF ISLAMIC LAW IN THE DIGITAL AGE:

Digitization And Discourse on Shalat schedule In Indonesia

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Abstract: This article aims to explain the tendency to prepare digital prayer schedules and offer the ideal form in compiling digital prayer schedules in Indonesia. The results showed that digital prayer schedules in Indonesia today tend to be arranged in the form of one area with a geographical boundary of the district or city. Currently, there is no digital prayer schedule in one geographic area due to differences in choosing coordinate points as the base of calculation and not the same in using the value of *ihtiyāt*. The ideal form in compiling a digital prayer schedule is to use the midpoint of the district or city in making the calculation headquarters, the value of the *ihtiyāt* is adjusted to the area which is used, and astronomical data is taken at a time close to the time of prayer to be known.

Keywords: *prayer time, islamic astronomy, digitization, islamic law.*



INTRODUCTION

One of the characteristics of human civilization that has entered the era of the 4.0 industrial revolution is the automation and digitization efforts of various sectors of human life. The success of this industrial revolution civilization is greatly supported by internet connections from various equipment used by humans. Digital systems can work with various functions, according to the program embedded in the processor used by the digital system. In this new era, all information can be easily accessed without any limitation of space and time, various information needs are easily obtained, both for the needs of scientific development and for worship needs such as knowing the schedule of prayer times wherever humans are (Mada Sanjaya, 2019: 3-4).

The digitization of the prayer schedule is an effort to fill human needs due to the changing times or the unavoidable industrial revolution. Many writings in the form of research discuss digitizing prayer schedules, such as the writing of Emil Naf'an (2019) in the form of an article with a title Accuracy of Digital Prayer Scheduling System Using Arduino as Controller, the results of testing the digital prayer schedule are classified as accurate and recommended by the author to be reproduced. Writing by Anton Yudhana, Abdul Fadlil, Safiq Rosad in the form of an article entitled Digital Prayer Schedule Using the Ephemeris Method Based on Smartphone Coordinates Points, the results of this study are also described as very accurate. Written by Darmawan, Sudjadi, Darjat in the form of an article with the title Design of Digital Clock Prayer Times Based on AT89S52 Microcontroller, the results of the design and testing are reported to be very good and accurate in displaying prayer schedules. Based on some of the results of this study, it can be concluded that efforts to digitize prayer time schedules have been made in digital form to fill the void in the digital era and mark the beginning of a new phase for prayer time schedules in Indonesia. The digital prayer schedule is a result of the transformation of prayer schedules in Indonesia that has passed three phases.

Prayer times in Indonesia are arranged based on the pseudo

circulation of the Sun which is considered constant every day with a time of 24 hours. Every day the sun rises at 6.00, culminates at 12.00 and always sets at 18.00. From this assumption, the beginning of *Zuhur* time always occurs at 12.00, the beginning of *Asar* time at 15.00, *Maghrib* prayer at 18.00, *Isha* prayer at 19.15 (-18°) and *Fajr* prayer at 4.30. This schedule is valid for the entire year in a place with standard time *istiwak* (Departemen Agama RI, 1994: 6-10). The preparation of prayer time schedules is also guided by the pseudo-circulation of the sun. However, the daily motion of the sun is not considered to be constant every day, the element of the declination value (globally) has been taken into account which results at the beginning of the prayer time always changing according to changes in the declination value. The beginning of the prayer time is arranged according to changes in the position of the Sun throughout the year. However, the standard of time is still using the hour *istiwak* standard. The beginning of *zuhr* time throughout the year becomes the benchmark for calculations for other prayer times which are set at 12.04 with the assumption that 4 minutes after the sun has culminated has slipped as a sign of the beginning of *zuhr* time (Departemen Agama RI, 1994: 6-10).

The preparation of prayer times in Indonesia has used accurate astronomical data, such as The Nautical Almanac published by the Royal Greenwich Observatory. In addition to using astronomical data, calculations also use spherical trigonometric formulas. The time benchmark has used regional time standards, such as WIB, WITA, and WIT. Regional time can be matched with radio, television, and other official clocks (Departemen Agama RI, 1994: 6-10). However, these three phases have of course been passed and now the prayer schedule in Indonesia is entering its fourth phase with a tendency to be in the form of a digital display.

The presence of a prayer schedule in digital form will change the paradigm of an ideal prayer schedule for the user. In the past, prayer schedules were only found in mosques, *mushalla* and places of worship, of course in very limited numbers. Not uniform prayer schedules in one area and not uniform echoing the call to prayer from mosques in one area is common because all of this is done manually, which of course has its

problems that are impossible when the first minute of prayer time, all *muazzin* are already ready to say the call to prayer, so at that time the ideal prayer schedule was a prayer schedule compiled with an agreed algorithm for accuracy. In the digital era with digital prayer schedules, uniformity after an accurate algorithm is the ideal paradigm in preparing prayer schedules. Not uniform digital prayer schedules will become public unrest in the digital era. It can be compared if in the past the number of prayer schedules could be calculated by the number of mosques and *mushalla* in an area because prayer schedules were only found in these places. Now the number of prayer schedules can almost be measured by the number of residents in an area because apart from places of worship, prayer schedules already exist in an electronic application or can be easily searched via a search engine on Google. You will feel anxious when there is breaking the fast together in a community, for example, when *Maghrib* prayer time becomes the eagerly awaited second as a sign of breaking fast time, how anxious the participants are if there are ten smartphones with prayer time applications that say *azan* at *Maghrib* difference with the duration of the difference up to five minutes from one another.

This paper tries to find the trends in the digital prayer schedule model in Indonesia and tries to offer an ideal model for digital prayer schedules in Indonesia, with an astronomical approach that is expected to be able to analyze to obtain a design of a well-established digital prayer schedule in the future. This article is important for those who want to use a digital prayer schedule, both for personal and public needs, and it is even more important for those who want to make a digital prayer schedule in the future.

This research is included in the type of library research (library research), in which the research is intended to determine the tendency of the method of arranging digital prayer schedules in Indonesia and to find an ideal method in preparing digital prayer schedules that are following the concept of the digital era. This research was conducted using a qualitative data analysis method, in which the existing digital prayer schedule preparation methods will be searched and classified. The

data used to be analyzed in this study are prayer schedules on the Bimas Islam website, prayer schedules compiled by LP2IF-RHI, Al-Habib prayer schedules, Muslim Pro prayer schedules, Islamic Finder prayer schedules, and Yogantara prayer schedules. With the astronomical approach, it can be seen that the trend in the form of digital prayer schedules is determined, the factors that cause differences in the results of digital prayer schedules, and it can be suggested that the ideal form in the preparation of digital prayer schedules.

THE BEGINNING OF PRAYER TIMES IN THE PERSPECTIVE OF FALAK SCIENCE.

The scholars of *falak* in compiling prayer time schedules refer to the hadiths and verses of the Koran. The results of the interpretation of the verses of the Koran and hadith can be concluded that the time for prayer is marked by the daily phenomenon of the Sun, namely the slipping of the Sun, the length of the shadow is the same as the object's length, the setting of the Sun, the disappearance of the evening light, and the appearance of dawn. The daily phenomenon of the Sun as an entry sign for prayer time can be grouped into three groups. (1) The event of the sun's shadow for the time of *Zuhr* and *Asr* prayers. (2) The event of sunset as the beginning of *Maghrib*. (3) The sun's a light bias for the *Isha* and *Fajr* prayers. From the three daily events of the Sun, a prayer schedule is arranged continuously, starting from the slipping of the Sun as an initial sign of entering the midday prayer time to the rising of the Sun as a sign of the end of the *Fajr* prayer time.

The daily events of the Sun can be determined in a fixed formulation by referring to the horizon coordinate system and equatorial coordinates. In calculating prayer times, these two coordinate systems are used simultaneously (coordinate transformation), namely the geocentric equatorial coordinate system and the horizontal coordinate system. In the geocentric equatorial coordinate system, two coordinate values are related to the calculation of prayer times. (1) RA (right ascension) is usually symbolized by Alpha (α) which is the angular value of the arc length of

a celestial body (Sun) which is calculated from the Vernal Equinox (VE) counterclockwise on the celestial equatorial plane to the position of the celestial body, the length arc one full rotation of 360 degrees or 24 hours. (2) The declination which is usually symbolized by Delta (δ) is the angular value of the arc length of a celestial body (the Sun) on the ecliptic line calculated from the celestial equatorial plane. In the equatorial plane, the declination value = 0 degrees, from the equator to the south pole of -90 degrees, while the north pole is 90 degrees (Rinto Anugraha, 2012: 49-62). With this coordinate system, the Christian calendar is also compiled which is then used as a guide in collecting solar data to calculate prayer times (Muhammad Himmatur Riza dan Ahmad Izzuddin, 2020: 84-163).

In the horizontal coordinate system, two coordinate values are very closely related to the calculation of prayer times. (1) The altitude value of a celestial body (Sun) is usually crossed with the value of the height angle of a celestial body from the arc length starting from the horizontal plane of the horizon to the position of the celestial body. On the flat plane of the horizon, the value of the height of the celestial body = 0 degrees. From the horizon to zenith it is worth 90 degrees and from the horizon to nadir, it is -90 degrees. (2) The azimuth value of a celestial body (Sun) is the angle value of the arc length on the horizon plane starting at the north point (azimuth value = 0 degrees) to the point of tangency to the vertical plane where the position of the celestial body is located (Rinto Anugraha, 2012: 49-62).

From the transformation of the two coordinate systems, which can be calculated the initial time of prayer by the guidance of *fiqh*, the two coordinate systems meet in the formula for finding the angle of the sun's time in each prayer time calculation. The formula for finding the time angle of the Sun is a formula for the change from the result of the transformation of the geocentric equatorial coordinates (Alpha, Delta) to the horizontal coordinate system (h, A): $\sin(h) = \sin(\varphi) \sin(\delta) + \cos(\varphi) \cos(\delta) \cos(HA)$. HA (Hour Angle) is the change from Alpha value with the formula $HA = LSM - \text{Alpha}$. Where LAS is the local sidereal time or local time. In the formula for finding prayer times, the symbol HA is usually used with the

symbol (t_o) which is known as the solar time angle. From the formula to find $\sin(h)$, it can be converted into the formula: $\cos(HA) = \sin(h) - \sin(\varphi) \sin(\delta) : \cos(\varphi) \cos(\delta)$. This formula is always used in calculating prayer times after knowing the height of the Sun for the beginning of each prayer time that you want to know (Rinto Anugraha, 2012: 60).

1. *The beginning of Zuhr time.*

The start of the *Zuhr* prayer time is marked when the disc of the Sun breaks from the meridian after reaching the upper culmination point in a place and ends at the time of the *Asr* prayer. To find out when the position of the Sun occupies the upper culmination point in a place, you can calculate the actual time (WH) with the formula: $WH = 12 - (e) + (Kwd) + i$.

2. *The beginning of Asar time*

The beginning of the *Asar* prayer time is marked when the length of the image of an object that is perpendicular to its length after deducting the length of the object's shadow (if any) when the Sun is on the meridian and ends when it enters *Maghrib* time. To calculate the start of the *Asr* prayer time in a place use the formula $= 12 - (e) + (t_o) + (Kwd) + i$.

3. *The beginning of Maghrib.*

The beginning of the *Maghrib* prayer time at sunset is marked by the release of the disk of the sun from the horizon line of sight (mar'i) of the observer from a location and ends at the time of *Isha*. The entrance sign for *Maghrib* prayer is different from other prayer times (*Zuhr*, *Asr*, *Isha*, and *Fajr*), *Maghrib* prayer is directly based on the solar disc, while other prayer times are based on the sun's reflection which is reflected on objects on the Earth's surface as a sign *Zuhr* and *Asr* times and the height of the Sun are calculated from the absolute horizon, some are based on the bias of the Sun's light in the atmosphere of a location such as the benchmark of *Isha* and *Fajr* prayer times and the height of the Sun is also calculated from the absolute horizon. Since the beginning of the *Maghrib* prayer time is directly based on the visibility of the solar disc, then in calculating the height of the Sun

as an entry sign for *Maghrib* time, it is necessary to consider the value of the low horizon caused by the low height of a location, the value of solar refraction, and the value of the semi-diameter of the sun, this is because the height of the sun that is used is the height of the horizon of the mar'i.

4. *The beginning of Isha's time.*

The beginning of the *Isha* prayer time is marked by the loss of the light of shafak and ends at *Fajr* time. Syafak's light, also known as evening light, is the refraction of sunlight from particles in space. When the sun sets, the evening light turns reddish yellow, then changes to a blackish-red colour and in the end the sky conditions turn dark, which is indicated by the sight of the stars (Zainuddin, 2020: 50). The physical condition of the loss of Syafak's light or evening light as a sign of entering the *Isha* prayer time is by changing from one colour to another due to the shift in the height of the Sun farther down towards the nadir point of the horizon (Abdul Niri, Mohd Zambri Zainuddin, Saadan Man, 2012: 102). The twilight light or the shafak light does not set along with the setting of the sun, assuming the length of the light is in a certain diameter, which results in the visibility of the upper end of the shafak light which is also influenced by the height and low position of the observer, such as in the calculation of the *Maghrib* prayer time.

5. *The beginning of Isha's time.*

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For example, the author calculates the prayer schedule for Lhokseumawe City on November 15, 2020. Geographical data of Lhokseumawe City that is needed:

- a. longitude (λ) = $97^{\circ} 08' 30''$ East.
- b. Longitude (φ) = $05^{\circ} 10' 48''$ North.
- c. Altitude = 50 meters above sea level.
- d. Basing on longitude (λ^w) = 105° Western Indonesian Mean Time (WIB).
- e. Time correction area (Kwd) = $(\lambda^w - \lambda): 15$.
 $= (105^{\circ} - 97^{\circ} 08' 30'') = 7^{\circ} 51' 30'' : 15 = 00.31.26$.
- f. The value of *ihtiyāt* = 2 minutes after the second value is fulfilled.

The beginning of Zuhur time.

$$\begin{aligned} \text{The formula used} &= \text{WH} = 12 - (e) + (\text{Kwd}). \\ &= 12 - (00.15.25) + (105^{\circ} - 97^{\circ} 08' 30'') : 15 \\ &= (105^{\circ} - 97^{\circ} 08' 30'') = 7^{\circ} 51' 30'' : 15 = 00.31.26 (\text{Kwd}). \\ &= 12 - (00.15.25) = 11.44.35. \\ &= 11.44.35 + (00.31.26) = 12.16.01. \\ &= 12.18. \text{ WIB.} \end{aligned}$$

The beginning of Asar time

Required data:

- 1) Sun's declination (δ_o) = $-18^{\circ} 37' 27''$. (05 Greenwich Mean Time (GMT)).
- 2) Equation of time (e) = 00.15.25. (05 Greenwich Mean Time (GMT)).
- 3) Zenith distance. $zm = \delta_o - \varphi$
 $zm = -18^{\circ} 37' 27'' - 05^{\circ} 10' 48'' = -23^{\circ} 48' 15''$
 $= -23^{\circ} 48' 15''$
 $= 23^{\circ} 48' 15''$ (absolute value).
- 4) Sun's height (h_o)

$$\text{Cotan } h_a = \tan z_m + 1$$

$$= \tan 23^\circ 48' 15'' + 1$$

$$= 34^\circ 45' 23.77''$$

- 5) Sun's time angle (t_o)

$$\text{Cos } t_o = \sin h_o : \cos \varphi : \cos \delta_o - \tan \varphi \times \tan \delta_o$$

$$= \sin 34^\circ 45' 23.77'' : \cos 05^\circ 10' 48'' : \cos -18^\circ 37' 27'' - \tan 05^\circ 10' 48'' \times \tan -18^\circ 37' 27''$$

$$= 50^\circ 36' 31.34'' : 15$$

$$t_o = 03.22.26.09$$

The formula used is $12 - (e) + (t_o) + (Kwd) + i$.

$$= 12 - (00.15.23) + (03.22.26.09) + (00.31.26).$$

$$= 12 - (00.15.25) = 11.44.35.$$

$$= 11.44.35 + (00.31.26) = 12.16.01.$$

$$= 12.16.01 + (03.22.26.09) = 15.38.27.09.$$

$$= 15.41. \text{ WIB.}$$

The beginning of Maghrib.

- a. Required data:

- 1) Sun's declination (δ_o) = $-18^\circ 39' 21''$ (11 GMT).
- 2) Equation of time (e) = $00.15.22.$ (11 GMT).
- 3) Semi diameter of the Sun (SD) = $00^\circ 16' 10.24''$. (11 GMT).
- 4) Refraction of the Sun (ref) = $00^\circ 34' 00''$.
- 5) Sun's height (h_o)

$$h_o = -(\text{ref} + \text{sd} + \text{ku})$$

$$\text{ku} = 0^\circ 1.76' \times \sqrt{50\text{m}}$$

$$= 0^\circ 12' 26.7''$$

$$\text{Sd} = 0^\circ 16' 10.24''$$

$$\text{Ref} = 0^\circ 34' 00''$$

$$h_o = -(0^\circ 34' 00'' + 0^\circ 16' 10.24'' + 0^\circ 12' 26.7'')$$

$$= -01^\circ 02' 36.94''$$

- 6) Sun's time angle (t_o)

$$t_o = \cos t_o = \sin h_o : \cos \varphi : \cos \delta_o - \tan \varphi \times \tan \delta_o$$

$$= \sin -01^\circ 02' 36.94'' : \cos 05^\circ 10' 48'' : \cos -18^\circ 39' 21'' - \tan 05^\circ 10' 48'' \times \tan -18^\circ 39' 21''.$$

$$= 89^{\circ} 21' 08.09:15$$

$$t_o = 05.57.24,54.$$

The formula used = $12 - (e) + (t_o) + (Kwd) + i$.

$$= 12 - (00.15.22) + (05.57.24,54) + (00.31.26).$$

$$= 12 - (00.15.22) = 11.44.38.$$

$$= 11.44.38 + (00.31.26) = 12.16.14.$$

$$= 12.16.14 + (05.57.24.54) = 18.13.38.54.$$

$$= 18.16 \text{ WIB}$$

The beginning of Isha's time.

a. Required data:

1) Sun's declination (δ_o) = $-18^{\circ} 40' 36''$ (13 GMT).

2) Equation of time (e) = 00.15.21. (13 GMT).

3) Sun's height (h_o) = -18° .

4) Sun's time angle (t_o)

$$t_o = \cos t_o = \sin h_o : \cos \varphi : \cos \delta_o - \tan \varphi \times \tan \delta_o$$

$$= \sin -18 : \cos 05^{\circ} 10' 48'' : \cos -18^{\circ} 40' 36'' - \tan 05^{\circ} 10' 48'' \times \tan -18^{\circ} 40' 36''.$$

$$= 107^{\circ} 16' 14,7'' : 15$$

$$t_o = 07.09.4.99.$$

b. The formula used = $12 - (e) + (t_o) + (Kwd) + i$.

Early Fajr time.

a. Required data:

1) Sun's declination (δ_o) = $-18^{\circ} 46' 13''$ (22 GMT).

2) Equation of time (e) = 00.15.17. (22 GMT).

3) Sun's height (h_o) = -20°

4) Sun's time angle (t_o)

$$t_o = \cos t_o = \sin h_o : \cos \varphi : \cos \delta_o - \tan \varphi \times \tan \delta_o$$

$$= \sin -20 : \cos 05^{\circ} 10' 48'' : \cos -18^{\circ} 46' 13'' - \tan 05^{\circ} 10' 48'' \times \tan -18^{\circ} 46' 13''.$$

$$= 109^{\circ} 23' 3,78'' : 15$$

$$t_o = -07.17.32,25.$$

b. The formula used = $12 - (e) + (t_o) + (Kwd) + i$.

$$= 12 - (00.15.17) + (-07.17.32,25) + (00.31.26).$$

$$\begin{aligned}
&= 12 - (00.15.17) = 11.44.43. \\
&= 11.44.43 + (00.31.26) = 12.16.09. \\
&= 12.16.09 + (-07.17.32,25) = 04.58.36,75. \\
&= 05.01. WIB.
\end{aligned}$$

From the calculation method for determining the time of prayer, it can be clearly understood that there are differences in preparing data or data requirements between one prayer time and another, this is because there is a difference in making the daily events of the Sun as an entry sign for prayer time, namely the sun's shadow event. for *Zuhr* and *Asr* prayer times, sunset for *Maghrib* prayer time, and biased sunlight for *Isha* and *Fajr* prayers. From the method of calculating prayer times above, it can also be seen that some data must be considered in preparing prayer schedules, namely the coordinate point, altitude, sun height, sun declination value, time-averaging value, and *ihtiyāt* value. Differences in using these data will lead to differences in results in the preparation of prayer schedules even though they are still in the same area. For example, prayer schedules that take the coordinates of the great mosque in a district will be different from the calculation results from prayer schedules that take the coordinates of other mosques that are still in the same district.

TYPES OF DIGITAL PRAYER TIMES IN INDONESIA

In the era of the industrial revolution 4.0, the emergence of more and more digital prayer schedules along with the ease of information from digital forms and the development of information technology. A digital prayer schedule is a prayer schedule that is arranged over one year and is also valid for all eternity but is displayed in the form of digital media, either in the form of an application or on a website. Currently, there are many mosques and *mushalla* with digital prayer schedules besides some that still use manual prayer schedules. No less, most people are currently using the prayer schedule application on their smartphones. Even if you don't use a prayer schedule application, at least knowing the prayer schedule in an area is very easy to find with the help of the Google search engine, you

just have to look for which region and the time when you want to know the prayer schedule, all available on digital media devices

Digital prayer schedules have a variety of forms. The diversity in digital prayer schedules is more influenced by the compilers' ability to use an astronomical component with a digital component. Either by using the website or application, the diversity of digital prayer schedules can be seen from the collection of coordinate data for prayer time calculation bases, some are based on geographic points of districts or cities that have been determined manually, some refer to the coordinate points where the hardware is working automatically assisted by the Google Map application. The difference in taking these coordinate points will result in a non-uniform prayer schedule even within the same district.

Differences can also occur in the use of hours, some are manual, some are automated with the help of an internet connection or assistance Global Positioning System (GPS). The difference is also due to the *iḥtiyāt* value, which sometimes there is a prayer schedule program that is not used automatically and has to be added by the user, some have used the 2-minute *iḥtiyāt* value. The difference in how these digital prayer schedules are arranged will be seen in the final result on the display of digital prayer schedules in one area when several digital prayer schedules are collected, even though the difference is only in units of 1 or 2 minutes.

Some forms of digital prayer schedules are joined by running text, where prayer schedules and hours are controlled by arduinoe (Emil Naf'an, 2019: 77-84). There is also a digital prayer schedule designed using the website, then this prayer schedule display can be accessed via computer and email, where the prayer schedule will appear according to the device's whereabouts (Desi Irsanti, 2018: 14-18). There is also a digital prayer schedule based on the AT89S52 microcontroller, where the prayer schedule is designed as a result of a combination of hardware and software which produces a digital prayer schedule (Darmawan, Suddjadi, Darjad, 2013). There is also a digital prayer schedule made in the form of an application and the results of the calculations according to the existence of a smartphone (Rosad, Yudhana, Fadlil, 2019). And some compile

digital prayer schedules whose calculation bases are based on geographic coordinate points, such as the digital prayer schedule for the Islamic Bimas of the Ministry of Religion (Bimas Islam RI, 2019) and prayer schedules for the Indonesian Rukyah Hilal Institute (Bimas Islam RI, 2019).

There is also a digital prayer schedule where the calculation process takes into account the altitude of the place and the time is directly connected to the internet so that the accuracy of the clock is always maintained, such as the prayer schedule in “Digital Prayer Time” by Hendro Setyanto (Fitri Yani, Syaifur Rizal Fahmy, 2019: 59-79). There is also a design for a digital prayer schedule using the Arduino Mega 2560 where when the prayer time arrives, Telegram users can immediately receive it (Juhariansyah, Ritzkal, Ade Hendri Hendrawan, 2020: 92095). In the preparation of the digital prayer schedule, the clock used greatly affects the digital prayer schedule, the digital clock is manually controlled, the accuracy does not last long, this clock will be faster than it should be in a matter of a few days. To maintain accuracy, digital clocks must be calibrated frequently, which is better if a digital clock is connected directly to the internet or a Global Positioning System (GPS) (Ismail, 2020: 75-90).

The development of digital technology has also influenced the emergence of prayer schedules in digital form, efforts to digitize prayer schedules are an effort that must be made to fill the void in space in the digital era. In the search engine “Play Store” smartphone when searching for the keyword “prayer schedule”, no less than 150 applications that present prayer schedules will appear automatically, this prayer schedule is of course a variety of ways of working along with the various ways of arranging. The same thing will also be found when searched by a search engine on Google, this is because most of the applications on smartphones are also in the form of websites that can be searched on the Google engine. To see how the results of prayer time schedules work and display on the website, the author tries to browse 6 websites that provide prayer schedules and the author takes an example of a search location for the Lhokseumawe City area with the selection of 23 October 2020.

Prayer times on the Bimas Islam website.

Website (Bimas Islam RI, 2019) This Islamic Bimas prayer schedule belongs to the Directorate General of Islamic Community Guidance (Bimas Islam) of the Ministry of Religion of the Republic of Indonesia which seeks to take part in filling the digital era by providing official information on prayer times in every district or city throughout Indonesia, for users to just choose a province and select regency or city of domicile. On the website, there is no other information that is commonly known about the method of calculating the prayer schedule, but at least it can be ascertained that in the calculation process the coordinate data already refers to the geographic coordinate point of each district or city. This can be seen from the process of finding the location of prayer schedules, only the names of provinces and districts or cities are available. Considering that this website is managed by an authorized institution in the matter of prayer schedules, it is not surprising that many other websites take the results of calculations from this website for their respective needs.

According to Novi Arijatul Mufidoh, Prayer schedules on the Bimas Islam website have used a modern algorithm, namely the Jean Meeus algorithm. The astronomical data used comes from the data in the book *Ephemeris Hisab Rukyat*. The criteria for calculating prayer times refer to the book *Science of Falak: In Theory and Practice* by Muhyiddin Khazin. That is, the height of the Sun for the prayer time *Mgrib* -01° , the height of the Sun for the beginning of the *Isha* prayer -18° , and the height of the Sun for the *Fajr* prayer time of -20° (Novi Arijatul Mufidoh, 2018).

Prayer schedules compiled by LP2IF-RHI.

The prayer schedule available on the website of the Indonesian Institute for the Study and Development of *Falak* Rukyatul Hilal Science (LP2IF-RHI) presents the same prayer schedule as Bimas Islam, which is based on geographic coordinates, only on the LP2IF-RHI website, there is a written coordinate point for each calculation. district or city and there is an explanation of the calculation method that can be analyzed what data is used in each step of the calculation. In this information, it can be explained that the altitude data is only used to calculate *Maghrib* time, the *ih̥t̥iyāṭ* value of 2 minutes, the height of the Sun for *Isha* prayer time -18°

and *Fajr* time -20 °, the coordinate point used for Lhokseumawe City is 05 ° 11' Lu, 97 ° 08' Bt.

Schedule for the Al-Habib prayer.

The prayer schedule available on the Al-Habib website is the same as on the Bimas Islam and LP2IF-RHI website pages, namely the prayer schedule for all time refers to the geographic coordinates of the regency or city, the coordinate points for Lhokseumawe City 05 ° 18' Lu, 97 ° 15' Bt. In calculating prayer times, Al-Habib follows the Islamic Bimas prayer time calculation method, but there is also an option for the user to set options on other methods he has compiled. Even though the calculation method follows the Islamic Bimas, the coordinate points are written on the website and are different from the coordinate points used by LP2IF-RHI, although they are both for the calculation of the prayer schedule for Lhokseumawe City. The difference in taking coordinate points affects the calculation results even within 1 minute, as shown in table number 1 (Alhabib, 2020).

Prayer times Muslim Pro.

Prayer times on the website Muslim Pro also provides perpetual prayer schedules for all districts or cities in Indonesia, the calculation method follows the Islamic Bimas and neither mentions the coordinate points for calculation, but the application of prayer schedules is not the same as the others. Muslim Pro does not rely on the geographic territorial lines of districts or cities in enforcing it, there is the possibility that it only considers the difference in longitude. for example, the Sawang Subdistrict is still geographically included in North Aceh Regency but the point of calculating prayer times refers to the coordinate point of Bireuen Regency which is west of Sawang District (Muslim Pro, 2020).

Islamic prayer schedule Finder.

Prayer times on the website Islamic Finder is a timeless prayer schedule that is also geographically based, meaning that prayer times are provided in the form of a district or city. The calculation method follows the calculation of the Islamic Bimas, but the results of the calculation of prayer times that are displayed do not yet use the *iḥtiyāt* value. The coordinate point for the calculation of prayer times in Lhokseumawe City

is $05^{\circ} 10' 48''$ “Lu, $97^{\circ} 09' 03''$ ” Bt. The difference in taking the calculation point and there is no *ihtiyāt* value causes the results of the calculation of prayer times for Lhokseumawe City which is displayed on the website page to be different from the results on other website pages (Islamic Fender, 2020).

Yogantara prayer schedule.

Prayer times on the website Yogantara is also an eternal prayer schedule that offers a geographic-based calculation of prayer times, that is, the results of the calculations are for districts or cities. The criteria for calculating the prayer times are used to refer to the Islamic Bimas criteria and there are other criteria available to choose from. The coordinates used are map-based and for Lhokseumawe City, it can be seen in the map that the prayer time calculation point is the coordinates of the Masjid Islamic Center Lhokseumawe City with coordinates $05^{\circ} 10' 48''$ “Lu, $97^{\circ} 08' 30''$ ” Bt.

From the prayer schedule for Lhokseumawe City on October 23, 2020, which is designated in table number 1, it can be understood that the current prayer schedule is not uniform for one area which is a small area such as Lhokseumawe City. From the explanation above, it can also be concluded that the Islamic Bimas prayer schedule is a lot of reference for the preparation of other prayer schedules, this is because the Bimas Islam website provides an Application Programming Interface (API) for those who want to use the prayer schedule. The tendency to arrange prayer time schedules based on geographic territories of districts or cities is very high and becomes very easy to understand by users. Taking coordinate points greatly affects the uniformity of the calculation of prayer times. The difference or non-uniformity of prayer schedules for Lhokseumawe City as shown in table number 1 above is only influenced by the value of *ihtiyāt* and the difference in taking non-uniform coordinates.

The uniformity of the calculation results of prayer times in the digital prayer schedule is greatly influenced by the knowledge of the compiler of the prayer schedule and the clarity of the place of reference. The formal and legal place of reference should be at the Ministry of Religion of the Republic of Indonesia, where only this institution has formal legality in

setting guidelines for prayer times in Indonesia. However, the fact is that many other parties in developing prayer schedules do not completely take the guidelines on prayer schedule services from the Ministry of Religion so that unequal digital prayer schedules for the same area cannot be avoided, this certainly indicates that there is limited information provided to users of prayer schedules from Bimas Islam which opens the door to false innovation for the next user.

When viewed from several existing digital prayer schedules, it can be grouped into several forms. (1) Some of the digital prayer schedules are set automatically with the help of the internet and some are set manually with the help of other applications such as the PowerLed LTS application. (2) The digital prayer schedule includes a coordinate point as the calculation base which is taken automatically with the help of the Global Positioning System (GPS) or internet service and some are set manually. (3) The display of digital prayer schedules is in the form of a website page, smartphone application, and there is also a light-emitting diode (LED).

IDEALIZATION OF DIGITAL PRAYER SCHEDULES IN INDONESIA.

In the Big Indonesian Dictionary (KBBI), the ideal is defined as something that is very by what you aspire to or dreams about or desired, while idealization is defined as an effort to adjust to what you aspire to or what you want. So, what is meant by the idealization of the digital prayer schedule in this paper is an effort to find a format for the digital prayer schedule that is following what is aspired or desired in the digital era. In this case, of course, the ideal format for prayer schedules in print media will differ from the ideal format in digital media. The certainty of this difference in ideal form can be proven from the cultural change as a result of the change in the media.

Digitalization is an effort to extend or continue the culture of print media. The presence of digital media has been able to change the direction of human habits from the need for print media to digital media. Changes in

human habits towards digital media have changed the sacred values that exist in print media, where digital media has shaped human traditions in abstract form, there is no difference in storage between the writings of the Koran, hadith, religious books, and other general books (Proglor Joseph dan Kianinejad Azra, 2016: 57). The ethics of storing and layout of these writings will find sacred value in print media. In this case, it can be ascertained that the culture of print media and digital media must have an idealization concept to maintain ethical values that are considered sacred in a culture with different ideal standards.

In the digital age, advances in technology have made the human mind an object to change human behaviour itself. The human mind can be read, controlled, and used as a dangerous weapon. The winners in the digital world are those who can master the human mind by contributing to many concepts in Big Data which is following the pattern of human desires in the virtual realm or digital realm. Truth and error in the digital world depend on the strength of a concept engineered in Big data. A concept will get justification if the mind has been controlled by a concept that has always been consumed by the mind in the virtual or digital realm (Kamaruzzaman Bustamam Ahmad, 2019: 116-126). This concept is closely related to digital prayer schedules, where the concept of digital prayer schedules has been circulating in cyberspace as understood in previous discussions of types of digital prayer schedules. If the digital prayer schedule is not properly controlled and conceptualized correctly in Big Data, there may be a justification for the prayer schedule concept which is wrong in the concept of sharia.

The ideal concept in preparing prayer schedules has been proposed by many astronomers in astronomy. Dahlia Haliah Mau'n In his research in the form of a dissertation entitled All Time Prayer Schedules in Indonesia, in this study, it can be concluded that the ideal all-time prayer schedule is a prayer schedule that does not result from conversion from other regions and takes into account the differences in latitude and longitude values of places when designated for one region. Certain (Dahlia Haliah Ma'u, 2013). Yuyun Hudhoifah In his research entitled Formulation of Ideal

Preliminary Prayer Time Determination, in this study the ideal prayer schedule is a prayer schedule that considers the average height of an area and the *iḥtiyāt* value must be used 2 minutes after the second value is rounded off. Ignoring the proposed ideal concept will result in non-uniform prayer schedules, this can be seen in the results of Muhammad Hidayat's research, the non-uniform factor of prayer schedules in North Sumatra is due to the absence of a uniform concept in taking astronomical data such as coordinates, declination, time zone, and *iḥtiyāt* (Yuyun Hudhoifah, 2013).

From these two results, two conclusions can be drawn: (1) The idealization in the prayer schedule concept has been pursued for a long time and continues to be pursued, searching for the ideal concept in a sustainable prayer time as a sign that science about prayer times continues to develop. (2) the ideal concept in the preparation of prayer time schedules refers to an accurate algorithm and uniform results. The accurate algorithm generates calculations according to the events of the Sun that are hinted at by the Koran and the hadiths as an entry sign for prayer time. A uniform schedule will produce confidence and comfort for prayer schedule users in carrying out prayer services.

Based on the ideal concept of prayer schedules and the theory of necessity for the concept of prayer schedules in cyberspace or digital realms, this paper proposes an ideal concept for digital prayer schedules. This ideal concept departs from the findings of non-uniform digital prayer schedules as seen in table number 1. In the digital world, uniformity of prayer schedules in an area becomes more important after the accuracy of the algorithm. In cyberspace or the digital world, the circulation of prayer schedules in one area can be hundreds, even thousands, depending on the number of people who use digital facilities to determine prayer times. Unlike the real world, the prayer schedule in circulation is no more than the number of mosques and *mushalla* in one area, there are even *mushallas* that are not equipped with prayer schedules. The large number of prayer schedules circulating in the digital world and not uniform for one district or city will result in doubts and inconvenience for users of

digital prayer schedules or users who will seek justification which in the end is not necessarily correct.

Ideally, a digital prayer schedule can produce uniformity within a region within a district or city. The uniformity of the digital prayer schedule will occur if two things are agreed upon in the preparation: (1) The point used as the base for calculating prayer times is the geographic midpoint of a district or city. Many mathematical ways can be taken in finding the midpoint of geographic coordinates, one of which, like what has been done by Moelki FahmiArdliansyah, is to use a polygon area with a geometric approach. (2) The *iḥtiyāt* value used must be adjusted to the geographic area of the district or city. The *iḥtiyāt* value here can be interpreted, apart from being a safeguard in rounding off when taking astronomical data, it also functions as a measure of the territorial area of a district or city from the centre point which is used as the base for calculating prayer schedules. So, the value of *iḥtiyāt* is not always 2 minutes, maybe more or maybe less, the value of *iḥtiyāt* is very dependent on the length of the geographic territorial radius line of the district or city which is calculated from the centre point.

CONCLUSION

The tendency of currently composing digital prayer schedules in Indonesia is prayer schedules. territorial-based geographic districts or cities. This means that the digital prayer schedule is arranged based on the area of the territorial line of a district or city, it does not exist in the form of conversion from one area to another.

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