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RESEARCH ARTICLE

DIVERSITY OF TIME ZONES AT BURJ KHALIFA IN PERFORMING PRAYERS AND FASTING IN SKYSCRAPERS

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Abstract

Determination of prayer and fasting times is an obligation for Muslims as one of the requirements for the validity of the worship rituals. The period of time for the implementation of prayer and fasting is set following the movement of the sun resulting from the Earth revolution about its axis. Earth's 24-hour revolution from west to east bringing about the apparent rising of the sun from the east and its setting in the west is an important factor in determining the time. However, a confusing situation arises for Muslims in determining the actual time for performing worship rituals when they are in high-rise buildings which are in the same position coordinates but at different heights as in towers and skyscraper buildings. This study intends to discuss the time zones with respect to determination of the worshipping time at the tallest skyscraper building in the world at this time i.e., Burj Khalifa. This study is qualitative research using an approach of document analysis. The results of the study found that height difference at Burj Khalifa gives rise to three different time zones according to the altitude. This can serve as a guide to other countries especially Malaysia which also has skyscrapers in the determination of prayer times in such buildings.

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Introduction:-

One of the requirements for worship is to know the time for prayer. Every person who adheres to the religion of Islam is obliged to ascertain when the time for each obligatory prayer starts and ends. This is in line with the methodology of Islamic jurisprudence (al-Nadawi 1994): "A matter without which the obligatory will not be complete, then the matter is mandatory". If time is not a condition for whether or not a prayer is valid, then one can just fulfil the obligation of prayer at any time, before or after the period of time a prayer should be performed. Determination of the time for prayer is already explained in the *fiqh* book whereby determination of time for each prayer requires for a reference to the movement of the sun. According to al-Khin et al. (2011), prayer time can be known by the following three ways: (a) Knowing it with surety, on the basis of clear evidence such as seeing the sun rising (*shuruq*) or setting (*ghurub*); (b) *Ijtihad*, on strong evidence with indirect indication such as by measuring

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shadows or by measuring the length of working time; and (c) Imitation or *taqlid*. In case of it is an improbability of knowing the time with certainty, or *ijtihad* on the times for prayers and their arguments, one should do *taqlid* following those who are knowledgeable of them with clear *daleel* or a *mujtahid* who holds on to strong *daleel* or argument or evidence.

Furthermore, *falak* scholars or experts in the field of astronomy nowadays have already set certain formulas and methods for calculating prayer times throughout the year to facilitate the Muslims. Therefore, Muslim community in a place only need to follow them and refer to the timetable of prayer times which is pre-determined by the religious authority under respective governments and communities need not to carry out *ijtihad* in determining their own prayer times.

Determination of Prayer Time according to Islamic Legal Sources

Division of prayers into five times in a day involves observing the movement of sun for ascertaining each prayer time, with position of the sun being the main reference point. This can be authenticated from Quranic verses and hadiths that explain times of prayer. In the Quran, Allah SWT says: “Establish prayer at the decline of the sun (from its meridian) until the darkness of the night and (also) the Quran of dawn. Indeed, the recitation of dawn is ever witnessed” (al-Isra’: 78). While in a Hadith, the Prophet Muhammad SAW said: “The time of *Zuhr* prayer remains till the sun declines and the shadow of a man becomes double of his length and so long as the *Asr* prayer does not come; and the time of *Asr* prayer remains so long as the sun does not become yellow; and the time of *Maghrib* prayer remains so long as the red hue does not disappear; and the time for *Isha*’ prayer remains up to the midnight; and the time for *Fajr* prayer runs from the appearance of dawn till the sun does not rise; but when the sun rises, keep away from prayer; because it rises between two horn of the devils” (Narrated by Imam Muslim).

Time Differences and Changes based on the Motion of the Sun

Each zone or area in a state or country has different prayer times and they will not remain the same at a single point in time only. This is already taken into account based on the situation that the earth rotates on its axis, always showing different movement of the sun which is measured from an observer or based on the height of an observation point from the sea level. The sun’s movement affects each prayer time for a location due to the sun’s inclination and declination causing its altitude and meridian time (*istiwa*’) to change (Haron et al. 2009).

On November 29, 2019, an official media statement was released by the Director-General of the Malaysian Islamic Development Department or Jabatan Kemajuan Islam Malaysia (JAKIM) after a meeting with the National Council Muzakarah Committee for Malaysian Islamic Religious Affairs or the Jawatankuasa Muzakarah Majlis Kebangsaan Bagi Hal-Ehwal Ugama Islam Malaysia (MKI) concerning the decision of adding an extra eight minutes for beginning time of the dawn prayer (*fajr* prayer) throughout Malaysia. The event happened due to a newly found discovery after research was done that gave the result that a change had occurred to the altitude parameter of the sun from 20° to 18° below the horizon, which complies to the beginning of true dawn (*fajr sadiq*). Each 1° of the earth rotation is equivalent to a duration time of four minutes; therefore, the existing prayer starting time for dawn prayer need an additional eight minutes delay following the found 2° difference on the altitude parameter of the sun (Office of the Mufti of Federal Territory 2019).

The difference in prayer times can also be seen not only because of following the time zone and highland areas as those which have been set in Malaysia, in fact the existence of issues that arises in the past few years concerns the time of prayer in skyscraper buildings such as Burj Khalifa in Dubai. A detailed study on this has not been carried out until now. Muslim community in such places suffices themselves by depending on the fatwa and opinion of the mufti only.

Burj Khalifa as the Tallest Skyscraper in the World

Burj Khalifa or the Khalifa Tower, formerly known as Burj Dubai, is the tallest skyscraper building constructed in Dubai, The United Arab Emirates which holds the record of being the tallest human-constructed structure ever developed in world history and no others have been able to surpass such construction since its building was completed in 2010 until today. The building records a height of 2,717 feet which is approximately 828 meters (Bianchi & Critchlow 2010). Construction started on September 21, 2004 until its external structure was completed on October 1, 2009 and was officially opened on January 4, 2010 (Baker & Pawlikowski 2015; Borthwick 2010).

The skyscraper structure has 163 floors including three observation decks on levels 124, 125 and 148. Residences and hotels are placed on levels 9-108, while offices occupy levels 109-154 (Aldred 2020). As the record holder for the world's tallest tower, Burj Khalifa also achieves the records of being the highest swimming pool ever constructed located on the 76th level and having the highest observation deck space in the world on the 124th floor. Burj Khalifa developer denied concerning the record of the world's highest mosque ever constructed, even though hundreds of media reports stated as such (Simpson 2011).

Prayer Time Zone Determination at Burj Khalifa

The uniqueness of praying at Burj Khalifa is that residents and visitors to the place fulfil their prayers not following the time zone only for each level. Determination of prayer time zones at Burj Khalifa has been divided into three time zones according to the floor levels. This was already made a fatwa by Dr. Ahmed Al Haddad, Grand Mufti at the Department of Islamic Affairs of Dubai. In an interview on Emirates Today media, Al Haddad gave a verdict that occupants of the tower at Burj Khalifa need to take their *sehri* earlier (before the time for *Fajr* prayer) and break their fast later (after the start of *Maghrib* prayer time) accordingly according to three different times. A time difference was found between the highest levels and the lowest levels closest to the ground level at the tower, especially during *Maghrib*, *Isha'* and *Subh* or *Fajr* prayers (Ghazal 2011).

The height of Burj Khalifa which nearly hit one kilometre surely gives an effect to the views of its residents and visitors at each and every level in the tower when seeing the sun rises and sets. At the start of the sun rising at the time of dawn, the highest levels will experience the appearance of sunlight first, earlier than the levels way below. Likewise at dusk, the people who are on the lowest levels will experience darkness and see the sunset earlier than the occupants on highest levels above them.

Therefore, Muslims on the top levels will experience a longer fasting period than those who are at the lowest levels because of the time of dawn at their spot comes earlier by a few minutes and *Maghrib* and *Isha'* time will also be a little later. See the diagram below of a sketch for knowing the time zone according to the level and height of the tower.

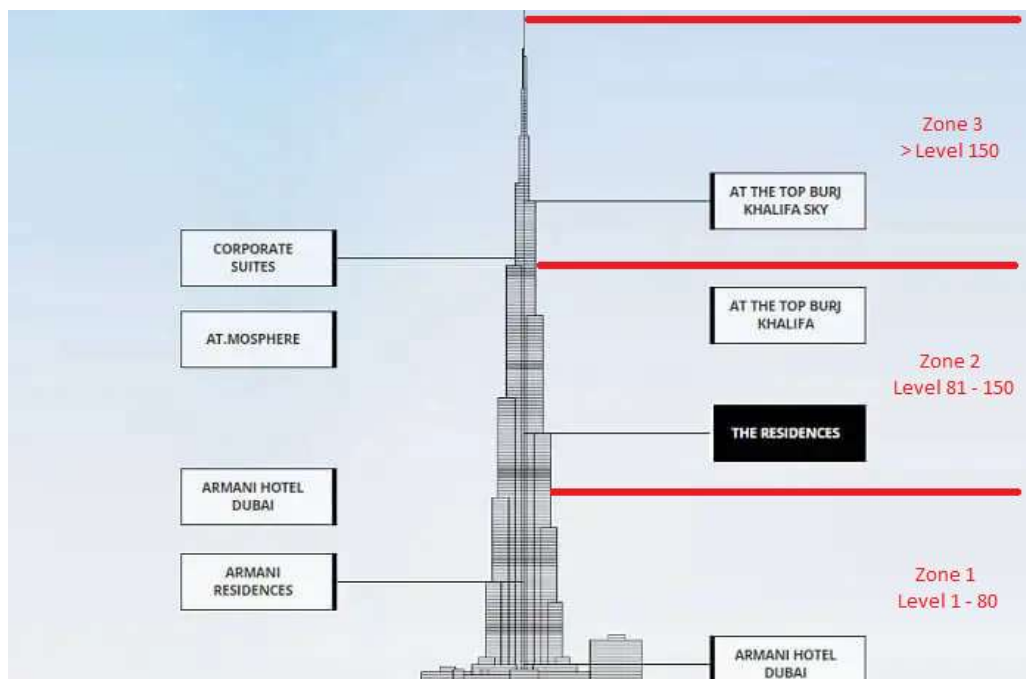


Figure 1:- Division of prayer time zones at Burj Khalifa. Zone 1 (Levels 1-80), Zone 2 (Levels 81-150) and Zone 3 (Levels > 150).

The first time zone at Burj Khalifa is the floors up to the 80th floor. The second time zone applies from level 81 to level 150. The third time zone is from the 151st floor to the peak of the tower. In the first zone first, prayer time and breaking fast time are earlier than that of the zones above it. This zone has the obligatory prayer time and the time

for breaking of the fast time which are the same as the times for the locality which is the city of Dubai. According to the agency which reported in Anon (2019), residents in the second time zone, the start for prayers and breaking of the fast are later by 2 minutes than the first time zone, but earlier by 2 minutes for *Fajr* and the start of fasting. The difference in obligatory prayer times and the time for breaking the fast in the third zone 3 minutes later than the first zone but for the dawn prayer time it is 3 minutes quicker than the first time zone. This situation makes residents in the third zone fast for 6 minutes longer than residents in the first zone. Figure 4.2 below shows a sketch depicting height level differences in Burj Khalifa which gives the effect on the determination of prayer time dividing it into three different zones.

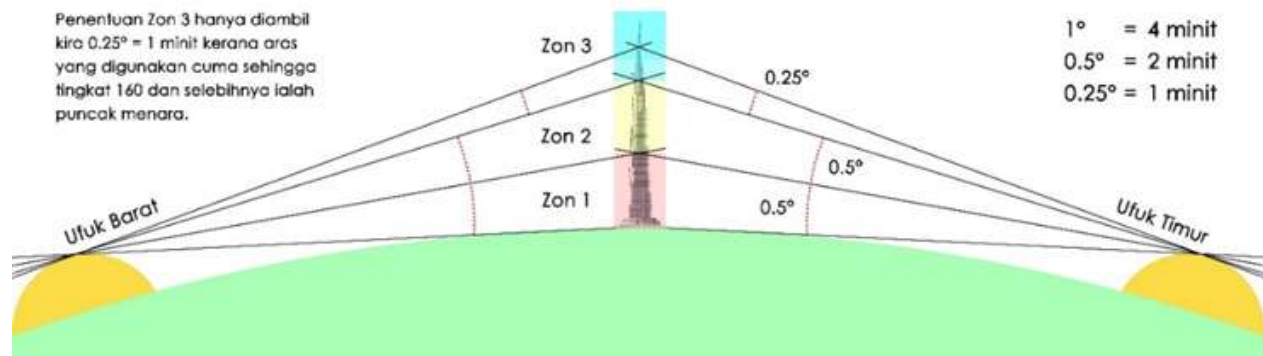


Figure 2: Viewing angle degrees from each zone to the sun at *shuruq* and *ghurub*. *Ufuk Barat* = West Horizon. *Ufuk Timur* = East Horizon. *Minit* = minute. *Zon* = zone. Determination for Zone 3 takes into account of 0.25degrees (equivalent to 1 minute) only because occupied levels are up to Level 160 and the rest is the tower pinnacle structure.

Calculation for the commencement of the dawn prayer time is considered when the sun appears in sight below the horizon at an angle of 18° . When residents in the third zone already experience *fajr sadiq*, position of the sun that can be seen by the residents in the second and first time zones are at an angle of 17.75° and 17.25° respectively. Therefore the difference in altitude degrees result in different calculation for prayer time due to the fact that every 1° of earth rotation takes 4 minutes.

As an example, if today is June 15, 2022, the dawn prayer time in the district of Dubai starts at 3:59 am, then residents in the first zone in the tower will follow the same time. Meanwhile, residents in the second zone already experience *fajr sadiq* at 3:57 am and in the third zone at 3:56 am. Similar calculation is done for *Maghrib* and *Isha'* prayers which come later by about 2-3 minutes than the local prayer time. Determination of the time for prayers in the third zone is not different by 2 minutes but by 1 minute only to the second zone because the height altitude range in the third zone is counted as half, considering that only up to level 160 of Burj Khalifa is used and the rest is the pinnacle structure of the tower (Anon 2022).

Conclusion:-

Determination of prayer time need to go through the process of observation of sunrise and sunset phenomena. After the research was done, results showed that residents in the areas of higher altitude will see sunrise earlier and sunset later. Therefore, for occupants of the tower who are on the top floors exceeding 0.5° of altitude from sea level, their time zone for prayer will be earlier at *Fajr* time and later at *Maghrib* and *Isha'*. This phenomenon too has an effect on the determination for the fasting time period. Though the difference is not significant and only involves a few minutes only, setting the right time is a duty and need to be known by Muslims because this matter involves the condition of validity of prayer and fasting worships. However, detailed formulae used in calculation for the degree of altitude and obligatory prayer times are not included yet. Hence, this research needs to be continued by future researchers to achieve more in-depth and extensive account for each time zone in skyscraper buildings

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