International Journal of Advance Social Sciences and Education (IJASSE)
Vol. 2, No. 6, 2024: 509-518

Use of the Jari Matic Method as an Angle on the Hijri Calendar Phalakiyah Procarc

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A R T I C L E I N F O

Keywords: Jari Matic, Orbital, Degree-Angle, Correspondence

Received : 19, October
Revised : 18, November
Accepted: 20, December

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A B S T R A C T

In this paper we construct Hijriyah Calen Dar plotted as graph of one-dimension base on the source of Quran, according the Quran both cultural and universe had limited termination of time. In this paper we also construct the design of instrument for measuring the degree-angle of the Moon, we do calculation "hisab" to forecast the moment of 1 Shawal in the future time until 1 Shawal 1500 H which is correspondence to the year 2077. From the previous scientist agree that the Earth rotate the Sun in 365.25days called Masehi calendar (M) and the other called Hijriyah calendar (H) which is simulate combination of the Moon as satellite of the Earth, the Earth rotate in its ash and also orbit the Sun therefore make the Moon illuminated changed every day, from crescent Moon to the next crescent Moon will be 29.52 days called one month, so therefore in a year will be 354.24 days. Mathematically M-H ≈ 11,01 days. Today is 1437 H correspondence with 2016 M, 2567 China calendar, 1938 Hindus calendar.

DOI: https://doi.org/10.59890/ijasse.v2i6.24
ISSN-E: 2988-2133
https://journal.multitechpublisher.com/index.php/ijasse

INTRODUCTION

Education is an activity or activity of conveying the values of truth, therefore education is the most important milestone or pillar of the progress of a society, nation and country. Education is an activity of learning and teaching interaction between students and teachers, it is very possible in one particular field someone has the status of a student who is studying and in another field it is possible as a teacher, so teaching and learning are the legacy of the predecessors, namely scientists and culminating in the prophets who provide knowledge to society, people to the nation and country. There is a famous term "seek knowledge to the grave" meaning that as long as the soul is contained in the body, learning and teaching activities do not stop. Superior human resources are the product of consistent, continuous education results obtained from both formal education environments (schools/boarding schools) and informal (training/workshops/training). In today's digital information era, the sophistication of information and communication technology has enabled the rapid exchange of information without being hampered by space and time. The aspect of education is one aspect of life that is closely related to information and communication technology. This paper explains the use of jarimatika as an angle on the Hijri calendar's astronomical protractor until the year 1500 H. The finger gesture icons in this paper focus on the clenched fingers in such a way as in Figure 2. Then two intersecting straight lines are made and the ends of the two lines touch the lower part of the clenched hand and the upper part of the clenched hand which form an angle where the fulcrum of the angle lies on the shoulder of the arm.

Design and construction is a form of skill/expertise that produces products in the form of prototypes/miniatures or actual/standard sizes and can even be in the form of software. Therefore, this expertise is used in various applied fields including political, social, cultural, science and technology, for example government design and construction, people's economic design and construction, language laboratory design and construction, house construction design and construction, waste processing design and construction, micro-organism cultivation design and plant fertilizers and so on. Basically, design and construction skills have the intention of being able to monitor the process of a phenomenon being studied. The Design and Construction of the Lunar Trajectory (TRB) is a device/unit to track the Moon so that the degree angle between the position of the Moon and the Sun can be read/monitored from the observation location.

LITERATURE REVIEW

Designing the TRB (Moon Telescope) first accepts existing and still valid agreements from previous scientists, for example the angle of the great circle is 3600, the duration of one orbit of the sunset to the next sunset is 24 hours, and one hour is equivalent to 60 minutes so that one degree is equivalent to four minutes (Purcell and Varberg, 1996). The agreement to determine the beginning of the Hijri calendar month (first trajectory) is when the Moon is seen on the western horizon with a certain angular interval at Maghrib time (Sunset), this

formation causes the reflection of the Moon's light to look crescent-shaped (Febi and Tiryono, 2008).

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In the work of designing the TRB, it is basically mapping or plotting the data from observations of the duration of the Sun and Moon's path on a Cartesian plane or 2-dimensional, therefore, observations or observations of the phenomenon must be made first. Field observations are carried out to obtain coherent information from a phenomenon, the information from the observation results is called observation data. Furthermore, the observation data is the main element for designing the TRB, the form of the design can be seen after going through the process of plotting/mapping the observation data on a Cartesian plane, namely two-dimensional Cartesian coordinates. In general, observation data is grouped into two types, namely probabilistic and deterministic data. Probabilistic data has the characteristic that the data obtained from the observation results do not appear periodically (fluctuation), while deterministic data is observation data that has a periodic tendency. In this work of observing the duration of the Sun and Moon's path, the data obtained has a periodic tendency, thus leading to a group of deterministic data (Tiryono, 2007a). Visually, the path of the Sun and the Moon seen from the surface of the Earth is a system, in this case the system of the path of the Sun and the Moon. The problem that will arise in the future related to the duration of the path is how long the deterministic duration of the path of the Sun and the Moon will remain in relation to the time tunnel of the Gregorian year being the same as the Hijri year. The next question is what is the need to mathematically analyze the possibility of changes in the duration of the Sun's path so that the days become longer than usual.

The development of science and technology provides hope for solutions to problems that have occurred in everyday life (problem-solving) and anticipates the recurrence of the same problems in the future or new problems that may occur. These efforts are expected to help solve problems with a scientific field as a foundation, ultimately these efforts are for common problems, especially those related to the natural phenomena of the correspondence of the Sun and Moon. Basic mathematics used to design the TRB structure includes angular measurement, Algebra, mapping on Cartesian plane coordinates, arithmetic operations (+, -, x, ÷) real numbers, line equations, derivatives/rates and trigonometry (Purcell and Varberg, 1996., Kreyszig, 1988). Angle Measurement is used for observation to measure the angle of the Moon to the horizon when the Sun sets using a protractor, Algebra constructs equations so that the correspondence between the Sun and Moon's path can be written in a simple linear equation, the study of Cartesian plane coordinates is used for mapping or projecting the Sun and Moon's path on a flat plane, arithmetic operations are used for calculations to facilitate the compilation of observation result databases, line equations are used to sketch the time tunnel of the Sun and Moon's path so that it can be seen in the form of a function graph, derivative studies are used to calculate the rate of each Sun and Moon's

path from the observation location and technological developments bring convenience so that in the future the design of this simple TRB will be increased in sensitivity in a hybrid mechatronic (mechanical and electronic) manner so that it can be monitored via a USB connection. With a positive thinking atmosphere, the natural phenomenon of the path of the Sun and the Moon can be traced that before the Gregorian calendar was initiated, the Hijri calendar had been running for thousands of years before the Common Era, likewise before the Hijri calendar was declared, the Moon-based calendar had been used thousands of years ago before 1 AH was established during the caliphate of Umar R.A.

METHODOLOGY



Figure 1. Finger Gesture Icons and Finger First with Two Tangent Lines at the Tip of the First



Figure 2. Projection of the Paths of the Sun and Moon on a Flat Plane/Cartesian Plane

1. Some of the steps and data required for trajectory projection on a plane include: Prepare the first layer of board/plywood as a Cartesian plane to map the counterclockwise orbit of the Sun with each coordinate axis given a number: the south axis is given the number 24/00, the east axis is given the number 06 (Sunrise), the north axis is given the number 12 and the west axis is given the number 18 / Sunset (assuming the duration of one sunset to the next sunset is 24 hours).

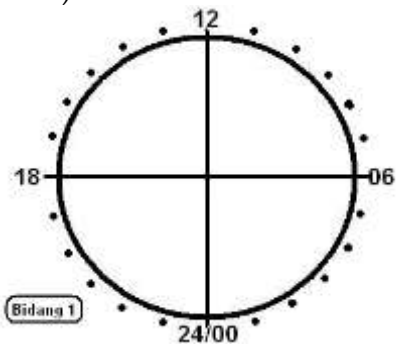


Figure 3. Some of the Steps and Data Required for Trajectory Projection on a Plane Include

Prepare a second layer of plywood/board with a smaller size than the first layer as a Cartesian plane to map the Moon's orbit, arranged clockwise, place the numbers/figures 0-29 with each number a distance of a fist which is equivalent to 12.2^0 degrees angle per fist, starting by placing the number 0 on the west axis, the number 8 on the north axis, the number 15 on the east axis, the number 23 on the south axis and the number 29.5 approaching the number 0 on the west axis. Thus on this plate there are 29.5 fists forming 360^0.

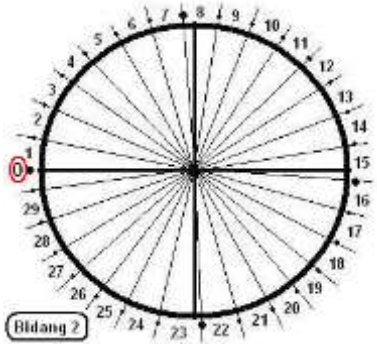


Figure 4. Prepare a Second Layer of Plywood

2. Verticality between the north axis and the south axis.
3. Converting Next, install the telescope made of PVC pipe on the axis/center of the two plywood plates using nuts and bolts.
4. Connect the pendulum using a piece of string to the north axis so that the main data is controlled to become other data (degree angle becomes time duration, time duration is used as coordinate data, coordinate data for the duration of the Sun and Moon's path can each be made into a line equation, the intersection of the two path lines is the point where the correspondence M=H occurs, in Algebra the number of years M=H can be obtained).

How to Assemble and Use TRB

1. The first layer of plywood/board that has been made has its center perforated as the axis/center of the circle with the diameter of the circle as the orbit of the Sun's path, so that if it is now 12 noon WIB then the position of the Sun is on the north axis marked with the number 12, but if it is 12 midnight WIB then the position of the Sun is on the south axis marked with the number 24/00. The second layer of plywood/board that has been prepared has its center perforated and combined with the first plywood with the axis or center of the plywood plate combined, because the size of the second plywood is smaller than the first, the orbit of the path on the first plywood is not covered by the second plywood. The first layer of plywood is set to fixed/still while the second layer of plywood can be rotated on its axis, the number 0 on the second layer of plywood acts as the Sun so that the number 0 on the second layer can be rotated to be directed according to the conditions at what time the observation is made. The installation of the PVC pipe on the axis of the plywood plate is intended to tighten the Moon, so that it is comfortable for the user, therefore it is recommended that the length of the PVC pipe is larger than the diameter of the first plywood.

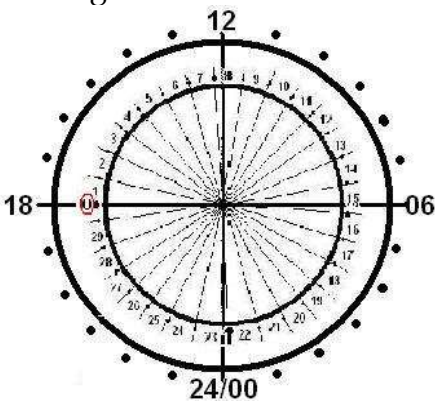


Figure 5. The First Layer of Plywood/Board

2. How to read the Moon's trajectory through the assembled TRB, position the TRB according to the cardinal points, namely the west axis facing west and the east axis facing east, make sure that the pendulum tied to the north axis coincides with the south axis, the number 0 on the second layer of plywood is positioned according to the Sun clock, then direct the PVC pipe to track the Moon until it is visible, by doing the steps above, the PVC pipe also acts as an arrow showing the corresponding number on the second layer of plywood, the number that coincides with the PVC pipe indicates the number of the Moon's trajectory. If the Moon is not visible to be tracked and the previous data has been known, then the position of the Moon can be tracked.

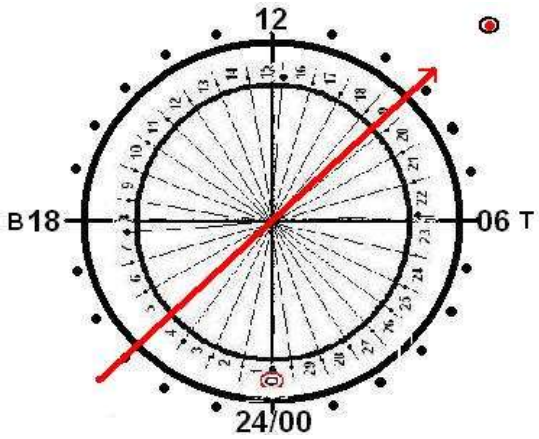


Figure 6. The Position of the Moon Can be Tracked

RESULTS AND DISCUSSION

Rational Answers to Reason as a Challenge

The brightness of the Moon's light can be seen for 28 days (1% - 100%), the 29th day is the new Moon (0%). The brightness of the first crescent moon (1st path) is 1- 3.5%, the 7th path is 50-60% brightness, the 14th-15th path is 100% brightness, the 21st path is 60-50% brightness and the 28th path is 3.5–1% brightness and the 29th path is the new moon with 0% brightness. Related to the periodic position of one projection line requires ≈ 29.52 days, then the angle of the Moon to the Sun shifts every day by 3600/≈29.52 ≈ 12.1950, or the Moon lags behind ≈ 48.78 minutes every day.

Table 1. M-H Calendar Correspondence Table in recommending 1 Syawal (Eid al-Fitr)

Year M	Recomendation Shawwal 1st	The angle of MES GMT+7	Year H
624	.....	.....	1
...	.....	.....	...
2000	Jan 08	11.5	1420
2000	Desem 27	12.1	1421
2001	Desem 16	11	1422
2002	Desem 05	5.5	1423
2003	November 25	11	1424
2004	Novem 13	3	1425
2005	November 03	9	1426
2006	Oktober 23	6.2	1427
2007	Oktober 12	6.2	1428
2008	September 30	5.5	1429
2009	September 19	1.0	1430
2010	September 09	5.5	1431
2011	August 30th	9.26	1432
2012	August 18th	1.75	1433
2013	August 08th	10	1434
2014	July 28th	9.3	1435
2015	July 17th	8.5	1436
2016	July 05th	4.5	1437
2017	June 25th	9.31	1438
2018	June 14th	0.5	1439
2019	June 04th	4.75	1440
2020	May 24th	12.2	1441
2021	May 13th	11	1442
2022	May 02nd	10.75	1443
2023	April 21st	7.9	1444
2024	April 09th	1.5	1445
2025	March 30th	5.2	1446
2026	March 20th	9.4	1447

Year M	Recomendation Shawwal 1st	The angle of MES GMT+7	Year H
2027	March 09th	4.5	1448
2028	Febr. 26th	3.25	1449
2029	Febr. 14th	3.76	1450
2030	Febr. 03th	2.76	1451
2031	Jan. 24th	8.5	1452
2032	Jan. 13th	0.8	1453
2033	Jan 02th	5	1454
2033	Dec 23th	12	1455
2034	Dec. 12nd	10.5	1456
2035	Dec. 1st	11	1457
2036	Nov. 19	9.4	1458
2037	Nov. 08	4.5	1459
2038	Okt. 29	8.5	1460
2039	Okt. 18	0.5	1461
2040	Okt. 07	6.5	1462
2041	Septem 26	4.2	1463
2042	Septem 15	4.2	1464
2043	Septem 04	3.5	1465
2044	Agust 24	11	1466
2045	Agust 13	2	1467
2046	Agust 03	5	1468
2047	Juli 24	11	1469
2048	Juli 12	7	1470
2049	Juli 01	6.5	1471
2050	Juni 20	5.5	1472
2051	Juni 09th	1	1473
2052	Mei 29th	5.75	1474
2025	March 30th	5.2	1446
2026	March 20th	9.4	1447

Year M	Recomendation Shawwal 1st	The angle of MES GMT+7	Year H
2054	Mei 08th	2	1476
2055	April 28th	9.5	1477
2056	April 16th	9	1478
2057	April 05th	8.5	1479
2058	Maret 25th	5.1	1480
2059	Maret 15th	11	1481
2060	Maret 03th	1.4	1482
2061	Feb 21th	7.2	1483
2062	Feb 10th	3.75	1484
2063	Jan 30th	1.9	1485
2064	Jan 19th	1.5	1486
2065	Jan 07th	0.2	1487
2065	Des 28th	3	1488
2066	Des 18th	10.5	1489
2067	Des 07th	3.1	1490
2068	Nov 26th	10	1491
2069	Nov 15th	9.6	1492
2070	Nov 04th	9.7	1493
2071	Okt. 24th	7.6	1494
2072	Okt. 12th	2	1495
2073	Okt. 02th	5.3	1496
2074	Sep. 22nd	10.1	1497
2075	Sep. 11st	4	1498
2076	Agust. 30	1.4	1499
2077	Agust. 19	1.8	1500
2077 M <==> 1500 H <==> 7500 N'Adam			

Quran Answer Standard: Mapping of Hijri Years on Dimension-1 (Timeline)

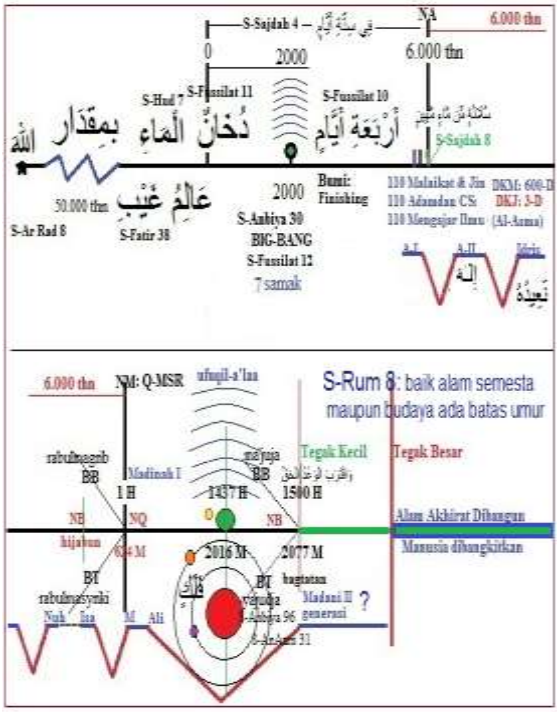


Figure 7. Quran Answer Standard

CONCLUSIONS AND RECOMMENDATIONS

From the results and discussions above, it is concluded as follows: One Hijri calendar month is ≈ 29.52 days long; The Moon's path lags ≈ 48.78 minutes behind the Sun's path every day. The angle of the Moon to the Sun shifts every day by 3600/29.52 ≈ 12.1950., and the difference of one year M-H ≈ 11.01 days. Both the universe and culture have a lifespan (S-Ar Rum 8).

FURTHER STUDY

This research still has limitations so further research is still needed on this topic "Use of the Jarimatic Method as an Angle on the Hijri Calendar Phalakiyah Procarc".

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