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Analysis Of Calendar System And Prayer Times In Almanac Djamiliyah By Saadoe'ddin Djambek (1953)

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ABSTRACT

Saadoe'ddin Djambek was an astrological reformer in West Sumatra who wrote many scientific books. Almanac Djamiliyah, one of his works, is a reference for determining the beginning of the month and prayer times. The calendar concept used in Almanak Djamiliyah comes from a combination of astronomical theories and scholarly thinking.

In addition, Saadoe'ddin Djambek's thought patterns underwent stages of progress so that he could produce an Islamic interpretation that could solve the problems of hisab thinking and the problems faced by his people. Although the Djamiliyah Almanac was intended for West Sumatra, some corrections make the prayer schedule usable for all countries up to 10° north and South of the equator.

In this paper, the author divides it into two problem formulations: how Saadoe'ddin Djambek made the Djamiliyah Almanac and how the concept of calendar and prayer times was used. It is hoped that this work will add to the collection of falak science and serve as a source of information and reference for future researchers.

I. Introduction

Almanac Djamiliyah is the work of a West Sumatran cleric named Saadoe'ddin Djambek, who contributed to the establishment of prayer times and other worship services in the West Sumatra region. Almanac Djamiliyah has been grounded for a long time in the people of West Sumatra. Almanac Djamiliyah is used as a prayer schedule to determine the beginning of the Qamariyah month in Indonesia. Until now, the Djamiliyah Almanac is still used by many large mosques that still truly state the validity of this Almanac. Saadoe'ddin Djambek's representative work is a valuable contribution. Traditional and moderate circles will always study it to develop hisab thinking in Indonesia.

The study of prayer timetables is closely related to the sun's position at each place on the earth's surface. Because the sun's position on the earth's surface looks different, astronomical calculations are needed to define each sign of the beginning of prayer time. In this paper, this difficulty is overcome by making correction lists so that the timetables can be used for all countries located up to 10° north and up to 10° South [1].

Although the master schedules in this book have been calculated for the Gregorian year 1953, they can be used for successive years. This is due to the small changes in the figures obtained yearly.

The primary aim of this paper is to explore Saadoe'ddin Djambek's perspectives on the calendar system and the method for determining prayer times. This exploration is particularly significant as it allows for the effective use of the prayer schedules in Almanac Djamiliyah by Saadoe'ddin Djambek for public purposes. By examining Djambek's methodologies, this research seeks to understand the principles and frameworks behind his calculations, providing clarity on their practical application for everyday use, especially for Muslim communities relying on accurate prayer times.

A notable feature of Djambek's method involves the rounding calculation results for simplicity and usability. All calculated outcomes, such as the main schedules and correction lists, are rounded to the nearest minute, with specific adjustments for seconds. Seconds less than 30 are disregarded, while those equal to or greater than 30 are rounded up to the next minute. This principle is extended to rounding degrees instead of minutes for declination schedules. Such rounding ensures that the presented data remains practical and accessible while retaining sufficient user accuracy.

This rounding system is applied in three stages to ensure consistency. Firstly, rounding occurs in the preparation of the master schedule. Secondly, it is implemented in the correction list, which adjusts specific variables. Lastly, it is applied when converting local time to regional time, accommodating regional variations in timekeeping. An exception to this process is the calculation of Zhuhr (midday) prayer time, where rounding occurs only twice. These meticulous steps highlight Djambek's attention to detail and commitment to balancing precision with practicality.

Despite the rigorous approach, the method does allow for minor calculation errors. By rounding up to three times in the process, the cumulative error can reach up to 1.5 minutes. This margin of error is considered acceptable given the schedules' purpose and usability for daily religious practices. The paper underscores Djambek's innovative timekeeping approach, which reflects his broader contribution to Islamic astronomy and is a valuable resource for communities needing reliable, user-friendly prayer time schedules [1].

This paper argues that Saadoe'ddin Djambek's thought process mirrors the developmental stages commonly observed in the intellectual journeys of reformers. His ideas evolved through careful reflection, critical analysis, and traditional and modern knowledge synthesis. Ultimately, Djambek successfully proposed an Islamic interpretation that he believed could address contemporary challenges in hisab (astronomical calculations) and provide practical solutions to the religious problems faced by his community. His work exemplifies how reformist thought can adapt to meet the needs of modern Muslim societies while remaining grounded in Islamic principles.

When examining the textual foundations of Djambek's ideas, it becomes evident that he sought to harmonize traditional interpretations by scholars with modern astronomical theories. This synthesis reflects his innovative approach to understanding religious texts in determining the beginning of prayer times. By integrating classical Islamic jurisprudence with contemporary scientific advancements, Djambek demonstrated a commitment to preserving the essence of Islamic teachings while ensuring their relevance in a changing world.

Djambek's efforts to merge these disciplines were theoretical and deeply rooted in practical application. His methodology emphasizes aligning religious observances with scientifically accurate calculations, ensuring precision without compromising spiritual significance. This approach underscores his belief in the compatibility of faith and science, offering a model for addressing similar challenges in other aspects of Islamic practice, such as calendar systems and fasting schedules.

Djambek's intellectual contributions ultimately represent a progressive yet grounded interpretation of Islamic thought. His ability to navigate the complexities of tradition and modernity provides a valuable framework for addressing contemporary issues in Islamic astronomy. Through his work, Djambek enriched the field of hisab and inspired a forward-looking perspective for integrating religious and scientific knowledge in the service of the Muslim community [2].

II. Method

This research employs a qualitative methodology, utilizing primary and secondary data to achieve its objectives. The primary data source is Saadoe'ddin Djambek's book, Almanac Djamiliyah, which is the foundational text for analyzing his methods of calendar systems and prayer time calculations. Secondary data are drawn from journals, scientific works, and encyclopedias that explore Djambek's contributions and Islamic astronomical thought. The researcher meticulously selects literature and studies directly relevant to the research theme to ensure the validity and depth of the analysis.

The data are analyzed using an inductive technique, which provides a descriptive framework for interpreting Djambek's methodologies. This approach facilitates a systematic synthesis of findings, allowing the study to highlight key aspects of his thought process and its practical applications. Then, combining insights from primary and secondary sources, the research aims to comprehensively understand Djambek's work, situating it within the broader discourse of Islamic astronomy and reformist scholarship.

III. Results and Discussion

A. Biography of Saadoe'ddin Djambek

His full name is H. Saadoe'ddin Djambek alias Datuak Sampono Radjo, born in Bukittinggi on 29 Rabi'ul Awal 1329 H, which coincides with March 24, 1911 M is the son of Shaykh Muhammad Djamil Djambek (1860-1957). His grandfather was Saleh Datuk Maleka, the head of Nagari Kurai. One very important element that is usually used as a basis for consideration in assessing the intellectual quality of a person, especially in recent times, is how much and to what extent the quality of scientific work has been produced. From this point of view, Saadoe'ddin Djambek is one of the hisab figures who left behind many scientific works [3].

The majority of Saadoe'ddin Djambek's professional activities and career were spent in the field of education, starting from elementary school to university level (lecturer). Saadoe'ddin Djambek became interested in and studied phalacology by studying with Sheikh Thaher Djalaluddin, a figure who greatly influenced his thoughts and insights into phalacology [4].

Besides being a phalacologist, Saadoe'ddin Djambek was active in organizations, including; in Palembang as a member of Muhammadiyah, leader of Hizbul Wathan West Sumatra (1930-1934), in Yogyakarta as a member of the Muhammadiyah Teaching section (1942-1943), member of the Sumatra and Central Sumatra Representative Council of the Islamic Faction (1946-1949), in 1958 appointed by the Government to attend the “Mathematical Education” Conference in India, in 1971 appointed by the Government to study the “Coprehensive School” system in India, Thailand, Sweden, Belgium, England, the United States and Japan in collaboration with UNESCO, in 1972 was assigned by the Minister of Religious Affairs of the Republic of Indonesia to research the development of astrology and social life in Mecca and in 1977 attended the invitation of King Abdul Aziz University Mecca in the meeting “First World Conference On Moslem Education" [5].

Saadoe'ddin Djambek's expertise in the science of hisab, falak science, astronomy and mathematics can be seen from the works he wrote [6]. Among his works are: Time and Schedule Popular Explanation of the Journey of the Earth, Moon and Sun (Tintamas: 1952), Almanac Djamiliyah (Tintamas: 1953), Qibla Direction and How to Calculate it by the Way of Spherical Triangle Measurement (Tintamas: 1956), Calculating the Beginning of Prayer Times (Tintamas: 1957), Comparison of Tarich (Tintamas: 1968), Guidelines for Prayer Times Throughout Time (Bulan Bintang: 1974), Prayer and Fasting in Polar Regions (Bulan Bintang: 1974), Hisab Awal Bulan Qamariyah (Tintamas: 1976) [7].

B. The History of the Formation of the Djamiliyah Almanac

Saadoe'ddin Djambek's thinking was a struggle between hisab experts and astronomers. The hisab expert who influenced his mindset was Sheikh Thaher Djalaluddin. This is as he himself admits in several of his books: “The path taken in calculating the times in this book is according to what is indicated by Jangmulia Sjech M. Thaher Djalalu'ddin in his book “Pati Kiraan on Determining the Five Times and Hala Qiblat with Logarithma" [1].

Saadoe'ddin Djambek's Almanac Djamiliyah generally uses Ulugh Beek As-Samarkandi's astronomical tables. In performing calculations, he uses the usual calculation method of adding (+), subtracting (-), multiplying (x), and dividing (:). Likewise, calculating the sun's altitude (irtifa') and hilal uses a simple method: the time of the sun is subtracted from the time of ijtimak and then divided by two [8].

Starting from the difficulty in the use of prayer time schedules which are generally only calculated for one particular place, and cannot be used for other places. Saadoe'ddin Djambek in his work Almanac Djamiliyah, the difficulty is overcome by organizing a list of corrections, so that in this way the schedules can be used for all countries located up to 10 ° north and 10 ° South of the equator [1].

C. Implementation of the Dating Concept in the Djamiliyah Almanac

The number of days in 1953 on each desired date:

Date	**Name of the Month**											
	Jan.	**Feb.**	**March**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**
1	1	32	60	91	121	152	182	213	244	274	305	335
2	2	33	61	92	122	153	183	214	245	275	306	336
3	3	34	62	93	123	154	184	215	246	276	307	337
4	4	35	63	94	124	155	185	216	247	277	308	338
5	5	36	64	95	125	156	186	217	248	278	309	339
6	6	37	65	96	126	157	187	218	249	279	310	340
7	7	38	66	97	127	158	188	219	250	280	311	341
8	8	39	67	98	128	159	189	220	251	281	312	342
9	9	40	68	99	129	160	190	221	252	282	313	343
10	10	41	69	100	130	161	191	222	253	283	314	344
11	11	42	70	101	131	162	192	223	254	284	315	345
12	12	43	71	102	132	163	193	224	255	285	316	346
13	13	44	72	103	133	164	194	225	256	286	317	347
14	14	45	73	104	134	165	195	226	257	287	318	348
15	15	46	74	105	135	166	196	227	258	288	319	349
16	16	47	75	106	136	167	197	228	259	289	320	350
17	17	48	76	107	137	168	198	229	260	290	321	351
18	18	49	77	108	138	169	199	230	261	291	322	352
19	19	50	78	109	139	170	200	231	262	292	323	353
20	20	51	79	110	140	171	201	232	263	293	324	354
21	21	52	80	111	141	172	202	233	264	294	325	355
22	22	53	81	112	142	173	203	234	265	295	326	356
23	23	54	82	113	143	174	204	235	266	296	327	357
24	24	55	83	114	144	175	205	236	267	297	328	358
25	25	56	84	115	145	176	206	237	268	298	329	359
26	26	57	85	116	146	177	207	238	269	299	330	360
27	27	58	86	117	147	178	208	239	270	300	331	361
28	28	59	87	118	148	179	209	240	271	301	332	362

29	29	-	88	119	149	180	210	241	272	302	333	363
30	30	-	89	120	150	181	211	242	273	303	334	364
31	31	-	90	-	151	-	212	243	-	304	-	365

Notes: This list can be used to find out how many days are between two known dates. **Example**: On March 5, the number 64 is obtained, and on July 25, the number 206 is obtained. Then the distance between the two dates is 206 - 64 = 142 days [1].

D. Implementation of the Prayer Time Concept in the Djamiliyah Almanac

The prayer time schedule in Almanac Djamiliyah is calculated for the equatorial region. As for areas north and South of the Equator, it needs to be corrected first. The corrections are generally of two kinds. Except for the beginning of Zhuhr time, which only needs one correction.

1. Correction of Zuhr Time

   The Zhuhr time schedule is valid for all countries according to local time. The only correction to be made is to move it to local time. Example: What was the time of noon on February 25 for Bukittinggi City (longitude 100° 22' T). The time of noon on February 25 was 12:13. Bukittinggi is located 100° 22' - 97° 30' = 2° 52' east of the North Sumatra longitude. 2° 52' is rounded to 2° 45', which is equal to 11 minutes. Thus, on February 25, for the city of Bukittinggi, the time of noon entered at 12:13 - 11 minutes = 12:02 North Sumatra time.

   If local time is used as local time, then it should be remembered that for areas West of the guided longitude line the time difference must be added (+), while for areas to the east, the time difference must be subtracted (-) [1].

2. Correction for times other than Zhuhr

   The correction for times other than Zhuhr is of two kinds. First, as indicated by the relevant correction list. Secondly, due to equalization with local time. The correction lists are of two types, First, for the same declination and latitude, meaning if they are both equally South or equally North. Secondly, for different declinations and latitudes. By different declinations and latitudes, we mean if the declination of the sun is North and the latitude of the country is South; or if the declination of the sun is South and the latitude of the country is North.

Example: What is the time of maghrib on January 21 for the city of Jakarta. The sunset time schedule on January 21 shows 6:16 pm. The latitude of Jakarta is 6° 10' N-S or rounded to 6° N-S. The declination of the sun on January 21 is 20° South. Since declination and latitude are both South, a list of maghrib time corrections is taken which shows that for a declination of 20° and a latitude of 6°, the correction is +9. This shows that on the date in question the time of maghrib entered for the city of Jakarta at 18:16 + 9 minutes = 18:25 local time. Jakarta is located 112° 30' - 106° 49' = 5° 41' West of the longitude line of Javanese time. 5° 41' is rounded to 5° 45', and this equals a time difference of 23 minutes. The maghrib time on January 21 for Jakarta is 18:25 + 23 minutes = 18:48 Javanese time [1]. By following the calculation method shown in the examples above, it is possible to obtain all the times of the year for each region of interest [1].

The results show that the phalac theory developed by Saadoe'ddin Djambek in Almanac Djamiliyah is relatively easier with astronomical data from developed countries, such as the Nautical Almanac from America, Ephemeris from the Soviet Union and others. Saadoe'ddin Djambek was the first astrologer to develop the Nautical Almanac system in Indonesia. At that time, the Ministry of Religious Affairs depended on the Nautical Almanac, purchased annually from the Navy Hydro Oceanographic Service in limited quantities and generally could only be obtained in June or July each year. While there is a need for up-to-date astronomical data, especially for calculating the beginning of the month of Ramadan, Shawwal and Dhulhijjah is not always after June and July, but they depend on the Hijri calendar.[9]

Saadoe'ddin Djambek contains a way of calculating the beginning of the month with a nautical almanac, and the calculation uses the formulas of a spherical triangle whose solution uses a list of logarithms. When calculating the initial height of the hilal (h), the formula used is Sin h = Sin p. Sin d + Cos p. Cos d. Cos t. The result of the hilal height with the formula is then corrected with Parallax, refraction, semi-moon diameter, and low horizon or Dip.[10]

This paper is different from other studies. Studies that other researchers have studied tend to show the determination of the beginning of the month and the hisab of the beginning of prayer time. In comparison, this paper focuses more on the concept and background of the emergence of the calendar system and the method of hisab, the beginning of prayer time developed by one of the previous reformers of falak science using simple calculations.

Based on the results that have been shown in the result section, this paper can add to the scientific treasury, especially in the field of astrology. So that it can be used as a guide for the community in recognizing the history and other methods offered in the Djamiliyah Almanac. As a scientific work, then this paper can be information and a source of reference for future researchers.

IV. Conclusion

Saadoe'ddin Djambek's thinking pattern in his work Almanac Djamiliyah was influenced by Sheikh Thahir Djalaluddin. The astronomical data in Almanac Djamiliyah is obtained from the astronomical data of developed countries, such as the Nautical Almanac from America, Ephemeris from the Soviet Union and others. Thus, Saadoe'ddin Djambek is known as a figure of phalacology who first developed the Nautical Almanac system in Indonesia.

The difficulty in using a prayer time schedule that has been calculated for one area and cannot be used for another, in the Djamiliyah Almanac can be overcome by organizing correction lists. For the purposes of worship, a final correction should be made to ensure that any errors that may have occurred during the calculation are avoided. The correction value is 1 or 2 minutes (for the beginning of Zhuhr time it is 1 minute, for the beginning of other prayer times it is 2 minutes. This research was limited to obtaining data, related documents, and did not conduct in-depth interviews. In fact, to get a more comprehensive understanding, comparative analysis is needed, which requires more diverse cases. In line with the limitations in this paper, further research is needed to obtain a better understanding.

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