

SCIENTIFIC APPROACH TO STUDY OF AL-QURAN MATHEMATICS

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ABSTRACT

The purpose of humans' creation in the world is none other than to worship Allah SWT and become caliphs on earth, which is explicitly stated in the Qur'an. Implicitly, there are two aspects of the purpose of human creation, namely the aspect of spirituality as a form of human servitude as a servant to their God and the aspect of intellect as a form of differentiating humans from other living things and as a leader on earth. Formation of spiritual aspects based on religious dogmas as doctrines, as well as intellectual aspects based on religious dogmas using rationality and empiricism approaches. The intellectual aspect is formed with an emphasis on science, one of which is mathematics, particularly sub-logic, reasoning, and more as the initial foundation for leadership on a micro- to macroscales.

Keywords: Science, Mathematics, Spirituality, Intellect, and Leaders

INTRODUCTION

Science and religion are integrated sciences that are complex and related; scientific knowledge cannot be separated from the knowledge of the Koran and Hadith, about which there is no doubt. However, there are some scientists who have the viewpoint that science and religion do not have independent interconnections in their respective positions because the field of science relies on tested data and has empirical evidence to ensure the truth of the science.

In contrast to religious science, on the other hand, it is ready to accept abstract and uncertain things based only on tangible variables of belief, but science will lead to religion if an empirical study is carried out because religion has complex characteristics. Religion and science must coexist independently of each other because, although both have similarities in their scientific missions, the fundamental difference between the two presents a conflict that will resonate at the core of each (Chanifudin dan Tuti Nuriyati, 2020)

Religion, with the dogma of the Al-Qur'an, in the development of science and knowledge gave birth to mathematical calculation methods as a scientific sub-science. This illustrates that the Al-Qur'an has an implicit role in modernizing scientific knowledge in the history of mathematics by giving birth to Muslim mathematicians.

RESEARCH METHODS

This research falls under the category of library research. Library research, also known as "*bibliographic research*," is research that is conducted by studying and analyzing data obtained from a library. The category of "library research" exists because the data needed to complete the research comes from the library, such as books, encyclopedias, dictionaries, journals, documents, magazines, and the like. This research is descriptive-analytical in nature, and the approach used is a conceptual approach. The method of collecting data or materials is done by reading and exploring various information; the data sources used are the Al-Qur'an and scientific concepts of mathematics.

RESULTS AND DISCUSSION

Science in Arabic is known as "al-Ilmu." In Indonesian, it is known as *sciencia*. Al-Ilmu in Islamic Studies means "understanding," knowledge, sign. Al-Ilmu is the antonym of the word al-Jahl (ignorance). In scientific terminology, science is knowledge about a field that is arranged systematically or knowledge obtained from experiments and observations. Science is systematic knowledge obtained from observation, research, and trials that lead to determining the nature or principle of something being investigated, studied, and so on (Warto., 2018)

1. A Scientific Approach to Islamic Studies

Islam is a dogmatic teaching that teaches that everything can be judged as good or bad. The scope of Islamic teachings does not only contain religious teachings but also covers various universal aspects, like in science. Islamic teachings provide insight into knowledge that brings people out of ignorance.

عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ

"It is God who teaches man what he does not know".

عَلَّمَهُ الْبَيَانَ

"He has created man and taught him al-bayan (smart speech)."

The Qur'an, as a source of knowledge, provides evidence that Allah is learning about human behavior. As a result, there are numerous aspects of Islam that are taught in a universal manner to provide knowledge.

كَمَا أَرْسَلْنَا فِيكُمْ رَسُولًا مِّنكُمْ يَتْلُوا عَلَيْكُمْ آيَاتِنَا وَيُزَكِّيكُمْ وَيُعَلِّمُكُمُ الْكِتَابَ وَالْحِكْمَةَ وَيُعَلِّمُكُم مَّا لَمْ تَكُونُوا تَعْلَمُونَ

"As We have sent you a messenger among you who recites Our verses to you, purifies you, teaches you the book and al-Hikmah (as sunnah), and teaches you what you do not know".

Islam is also a religion that reflects reason in various aspects of teachings by making it a condition for practicing religion. The role of reason in Islamic teachings shows that this religion is guarded, upheld and run by various kinds of intelligent and intelligent people, in other words Muslims must be intelligent. This is why Allah denounces those who do not use reason(Warto, 2018)

إِنَّ شَرَّ الدَّوَابِّ عِنْدَ اللَّهِ الصُّمُّ الْبُكْمُ الَّذِينَ لَا يَعْقِلُونَ

“Indeed, the worst creatures for Allah are deaf people who are deaf and have no sense of”

Islamic teachings, which lead to the Qur'an in particular, provide a concept that has wisdom, knowledge, and faith that requires deepening, contemplation, and research.

إِنَّ فِي خَلْقِ السَّمَوَاتِ وَالْأَرْضِ وَاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ وَالْفُلْكِ الَّتِي تَجْرِي فِي الْبَحْرِ بِمَا يَنْفَعُ النَّاسَ وَمَا أَنْزَلَ اللَّهُ مِنَ السَّمَاءِ مِنْ مَّاءٍ فَأَحْيَا بِهِ الْأَرْضَ بَعْدَ مَوْتِهَا وَبَثَّ فِيهَا مِنْ كُلِّ دَابَّةٍ مَّهِمَّةٍ وَتَصْرِيفِ الرِّيْحِ وَالسَّحَابِ الْمُسَخَّرِ بَيْنَ السَّمَاءِ وَالْأَرْضِ لَآيَاتٍ لِقَوْمٍ يَعْقِلُونَ

“Indeed, the creation of the heavens and the earth, the alternation of night and day, the ships that sail on the sea with loads that are beneficial to humans, what Allah sends down from the sky in the form of water, then He revives the earth after it dies (dry), and He spreads various kinds of animals in it, and the winds and clouds that are controlled between the heavens and the earth, (all of that) are signs (of Allah's greatness) for people”.

Problems with the process of obtaining and discovering existing science, whether it is obtained or discovered, Imam As-Suyuthi has a view regarding science: the path of knowledge is muktasabah (acquired) and laduni. Laduni science is science in the accepted category. The development of the paradigm of the speed and efficiency of human thinking is very fast and dynamic, which proves the development and progress of science are capable of bringing very drastic changes to human life.

يُنَبِّئُكُمْ بِهِ الرَّزْعَ وَالزَّيْتُونَ وَالنَّخِيلَ وَالْأَعْنَابَ وَمِنْ كُلِّ الثَّمَرَاتِ إِنَّ فِي ذَلِكَ لَآيَةً لِقَوْمٍ يَتَفَكَّرُونَ

“With the rain, He causes to grow for you plants, olives, dates, grapes, and all kinds of fruits. Indeed, there is a sign (of Allah's greatness) in that for those who believe”.

The verse above shows that science is accepted as stated by Imam As-Suyuthi on the basis of Allah's explanation that rainwater grows for you various plants that you can use to meet your needs. With the rain, Allah also grows fruit-producing trees, such as olives, dates, grapes, and all kinds of fruits from trees that are not mentioned. Indeed, in this,

namely the rain and the pleasure it brings, there is a clear sign of the greatness, majesty, and power of Allah for those who think.

Science, according to Imam As-Suyuthi's view, was obtained by studying An-Nahl (16):11 scientifically, which shows that water provides benefits for plants as a basic source of life for all creatures, especially plants. Water also functions to remove nutrients from the soil, which are absorbed by plants, and then spread to meet the needs of plants, which then help plant photosynthesis activities and produce fruit that is consumed by living things.

The sources and paths for acquiring science or knowledge are as follows (Aziz,2018):

- a. The source of science or knowledge is God.
- b. Science can be achieved by humans through interpretation (iqra). Interpretation of the verses of the Kauniah produces sciences from nature that give birth to physics, chemistry, and geology. Medicine and psychology arose from man. Humans as social beings gave birth to the sciences of history, culture, and sociology. The interpretation of the Qur'anic verses produces knowledge of the Qur'an, the language of the Qur'an, the science of hadith, and the science of fiqh.

Based on these sources, humans are aware of the limitations in interpreting how science is still a mystery to submit, surrender, and obey God. They realize that knowledge and technological capabilities originate from God and become the motivation to fulfill God's mandate. Based on this, it creates the belief that there is no conflict between the science of the Qur'an (religion) and the science of Kauni (general), because they come from the same source and give awareness that science is not the only source of truth and the way to solve human problems.

Islam as a religious doctrine instructs humans to always pay attention to the universe and examine it. This is among others mentioned by Allah SWT :

وَسَخَّرَ لَكُمُ اللَّيْلَ وَالنَّهَارَ وَالشَّمْسَ وَالْقَمَرَ وَالنُّجُومَ مُسَخَّرَاتٌ بِأَمْرِهِ إِنَّ فِي ذَلِكَ لَآيَاتٍ لِّقَوْمٍ
يَعْقِلُونَ

“He has subjected the night and the day, the sun and the moon, to you, and the stars are controlled by His command. Indeed, there are genuine signs (of Allah's greatness) for those who comprehend”.

Prof. Yoshihide Kozai from Japan has found the answer to his question about the star-forming smoke that adorns the universe after he met the Muslim scientist Sheikh Abdul-Majeed A. Zindani. When they met, he was given a special banquet. Specifically, in the form of a letter QS. Fushilaat: 11, which explains the contents of the universe's and sky's beginnings. It turned out that the verse made Kozai both aware and amazed, so the professor then focused his research on Al-Quran sources (Warto,2018)

ثُمَّ اسْتَوَىٰ إِلَى السَّمَاءِ وَهِيَ دُخَانٌ فَقَالَ لَهَا وَلِلْأَرْضِ ائْتِيَا طَوْعًا أَوْ كَرْهًا قَالَتَا أَتَيْنَا طَائِعِينَ

“Then He went to the sky, and the sky was still smoke. Then He said to him and to the earth, “Come both of you according to My orders, obediently or forced.” Both of them replied, “We came obediently”

Based on this reality it is very important for us to study Islam using a scientific approach. Many things, which contemporary scientists have just realized, that the scientific facts have been known to Muslims since fourteen centuries ago.

2. Al-Qur'an Mathematical Approach

Human civilization has a history related to religion and science, which are two important parts of human life. In fact, the conflict between religion and science does not need to occur if we are able to reconcile the ideas of religious spirituality with science. The search for science and mathematics is an effort to find out God's verses in the universe about how to realize God's majesty. To understand mathematics well, it is necessary to understand it comprehensively, not partially, meaning that if you understand it to the point that there are benefits to this knowledge, it will be easy to understand and you will come to believe that mathematics is close to life.

Mathematics is a process of reasoning, mindset, and the formation of objective, honest, systematic, critical, and creative attitudes as well as supporting knowledge in making a decision, so indirectly studying mathematics means learning how the problems encountered are immediately resolved. For example, the concepts of geometry and logic are very closely related to everyday life. What you see in a shape or building cannot be

separated from flat, curved, two-dimensional, three-dimensional geometry, and so on. Similarly to logic, studies reach conclusions through logical reasoning (Hariman Surya Sirega dkk)

In general, the general concept of mathematics in the Qur'an includes several studies on algebra, sets, geometry, measurement, logic, and statistics. The approach to mathematics and religion is not done simply by looking for religious arguments for mathematics. Moreover, it is not done to Islamize mathematics. The relationship between mathematics and religion is not an Islamization process. This integration is not to produce Islamic mathematics, because if this happens, it will also appear as Christian mathematics, Hindu mathematics, Buddhist mathematics, Confucian mathematics, or others. This approach is not to give religion to mathematics but to make religious people more religious through mathematics. Not so much the Islamization of mathematics as the Islamization of humans and their surroundings through mathematics. Thus, mathematics becomes a means for humans to carry out the purpose of its creation (Abdul Fattah Nasution, 2017)

Looking back at the purpose of creating humans, who have the main understanding and duties of servants who always serve God.

وَمَا خَلَقْتُ الْجِنَّ وَالْإِنْسَ إِلَّا لِيَعْبُدُونِ

"And I did not create jinn or humans except for the purpose of serving Me"

Then, more than a servant performing the service of God, man was created for the purpose of being a leader on earth.

وَإِذْ قَالَ رَبُّكَ لِلْمَلٰٓئِكَةِ إِنِّي جَاعِلٌ فِي الْأَرْضِ خَلِيفَةً ۗ

Remember when your Lord said to the angels: "Verily, I will make a caliph on earth"

The position of humans on earth is predicated on their being servants in God's eyes and leaders on earth. When examined more deeply, there is an implicit meaning in humans, namely aspects of spirituality and aspects of intellect. This is based on humans as servants who perform servitude as spiritual beings, and humans as intellectual leaders.

وَاللَّهُ آخِرَ جِكْمٍ مِّنْ بَطُونِ أُمَّهَاتِكُمْ لَا تَعْلَمُونَ شَيْئًا وَجَعَلَ لَكُمُ السَّمْعَ وَالْأَبْصَارَ وَالْأَفْئِدَةَ ۗ لَعَلَّكُمْ تَشْكُرُونَ

“And Allah brought you out of the wombs of your mothers, knowing nothing, and He gave you hearing, sight, and hearts, so that you may be grateful”

Humans are born into the world with complete ignorance about everything. Spirituality is formed on the basis of indoctrinated religious dogmas. Human intellect is formed on the basis of scientific dogma, either through rationality or empiricist approaches. In relation to humans as leaders, of course, this has been a decree of Allah SWT; basically, the formation of the spirituality and intellectuality of leaders in the Qur'an refers to the iqra' commandment as the first step in forming the character of a leader.

إِقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ

” Read with (mentioning) the name of your Creator”.

In the formation of these leaders, the intellectual aspect with the al-Qur'an mathematics sub-approach plays a role in forming aspects of logic and reasoning even more than that. The intellectual aspect is the risky role of reason as a differentiator between humans and other living things and as a differentiator between humans as human beings who are allowed to carry out religious law and those who are not.

3. The Urgency of Al-Qur'an Mathematics

The word "mathematics" comes from the Greek word "mathema," which means something to be learned or something to be known. Mathema is derived from the word manthano, which is equivalent to the word mathaino, which means learning. Etymologically, mathematics can be interpreted as knowledge obtained by thinking. Mathematics grows and develops due to thought processes, so logic is the basis for the formation of mathematics. Based on the etymological understanding of mathematics, it appears that mathematics develops thinking and reasoning abilities. The thinking skills developed include systematic, logical, analytical, critical, and creative thinking.

a. Development of Mathematics from the Qur'an

The development of mathematics originating from the Qur'an is explained explicitly in relation to numbers, number relations, number operations, ratios and proportions, sets, and measurements.

While implicitly the mathematics explained from the Qur'an relates to relations, functions, estimation, statistics, and mathematical modeling, For example, to discuss the

concept of the set, start by studying the letter al-Fatihah about human groups, the early part of the letter al-Baqarah about human groups, the letter an-Nur about groups of animals in verse 45, the letter al-Fathir about groups of angels in verse 1, or Surah al-Waqiah about human groups in verses 7–14.

b. Mathematical Instrument Application of the Qur'an

The use of mathematics in the application of the shari'a commands contained in the Qur'an is found in the implementation of the scope of fiqh, namely fasting, zakat, pilgrimage, and the distribution of inheritance (faraidl). Former Muslim mathematicians studied mathematics, especially for faraidl problems, making calendars, determining the Qibla direction, calculating prayer times, determining the value of zakat, and other muamalah. The application of mathematics from the Qur'an with the aim of being used in carrying out the duties of servitude as well as the duties of the caliphate, both in leadership on a family scale and on a general public scale.

Example of Inheritance :

Faraid science is one of the most important disciplines in Islam to study. In pure mathematics, there are several mathematical concepts, namely the concept of rational numbers. Pay close attention to the Koranic verses on inheritance, particularly Surah An-Nisaa verses 11, 12, and 176. Allah SWT explains in such detail the division of inheritance for each heir, namely one-half, one-fourth, one-eighth, two-thirds, one-third, one-sixth, and so on (Muniri, 2016)

A corpse (husband) leaves heirs consisting of a wife, mother, son, and two daughters. Total assets are IDR 300,000,000; of this amount, IDR 50,000,000 is an inheritance before marriage. The corpse owes IDR 10,000,000 in debt, IDR 5,000,000 in infaq, and IDR 7,000,000 in maintenance obligations. So, the division of inheritance is done mathematically as follows .

1. The inheritance of the corpse is half of the total joint assets plus inherited assets, namely $12 \times 250,000,000 + 50,000,000 = 125,000,000 + 50,000,000 = 175,000,000$, while the remaining Rp. 125,000,000 belongs to the wife who is still alive and is not inherited.
2. The corpse's relics are worth IDR 175,000,000 less debts, wills, and funeral services, for a total of $175,000,000 - (10,000,000 + 5,000,000 + 7,000,000) = 152,000,000$.

Inheritance share of assets: wife 1/8, mother 1/6, the rest goes to children.

Ahli waris	Bagian hak waris		
Istri	1/8	$3/24 \times 152.000.000$	Rp19.000.000
Ibu	1/6	$4/24 \times 152.000.000$	Rp25.333.000
Anak	Sisanya	$17/24 \times 152.000.000$	Rp107.667.000
		Total	Rp152.000.000

Inheritance rights for children amount to Rp. 107,667,000, divided by the provisions that the share of the son is 2 times the share of the daughter. So for boys, $2/4 \times 107,667,000 = \text{Rp. } 53,833,500$, while each girl gets Rp. 26,916,750/child.

c. Mathematical Instruments Explaining the Qur'an

Explanation of the Qur'an using mathematics can be exemplified by several stories told in the Qur'an, such as the story of Ashabul Kahfi.

وَلَبِثُوا فِي كَهْفِهِمْ ثَلَاثَ مِائَةٍ سِنِينَ وَازْدَادُوا تِسْعًا

“They remained in their cave for three hundred years (siniin) and nine years more”

One Syamsiyah year (S) contains 365.2422 days, while one Qamariyah year (Q) contains 354.361 days. Syamsiyah, the mathematical explanation for QS 18:25 is that Ashhabul Kahf lived in the cave for 300 years. If 300 Syamsiyah years are to be made into Qamariyah years, then it is the same as 309 Qamariyah years. The mathematical calculation is like this (Abdussakir dan Rosimanidar)

300 Syamsiyah (S) years	(300×365.2422)	=	109572.66 days
300 Qamariyah years (Q) equals	106308.3 days	(300×354.361) .	
109572.66 days	-	106308.3 days	= 300 S - 300 Q
			= 3264.36 days.
3264.36 days	equates	to	9.211 Qamariyah years.
300 Syamsiyah years	are equal to	300 Qamariyah years	plus 9 Qamariyah years.
			= 309 Qamariyah years

So, Ashabul Kahf lived in the cave for 300 Syamsiyah years, which is the same as 309 Qamariyah years.

d. Mathematical Instruments Conveying the Qur'an

The use of mathematics in conveying the Qur'an relates to explaining the concept of sets using examples of sets of names of obligatory prayers, sunnah prayers, names of days or months in Islam, names of prophets, names of angels, names of prophet ulul azmi, names of letters in the Quran, the name of the Madaniyah letter, or the name of the Makkiyah letter. In explaining relations and functions, using the examples of the name of the prayer and its rak'ah, the name of the letter and the number of verses, or the deeds and their reward.

4. Content of the Golden Ratio in Surah An-Nisa

The inventor of the golden ratio series on Fibonacci is Leonardo Pisano (1175–1250), a mathematician from Italy. The creation of nature, which has a value of beauty and aesthetics, has an order; the universe runs like a machine that is systematic and has a rhythm, which is Fibonacci; all aspects of life, including the limbs starting from the face and stretching the right and left hands, are related to 0.618, and 0.618 is the golden ratio or two-thirds of everything that exists in life, even human DNA. (A. Zainal Abidi dkk, 2021) classified Fibonacci with the Fibonacci retracement model, Fibonaccifann, Fibonacci arc, Fibonacci expansion, Fibonacci time zone, and Fibonacci harmonics.

Verses regarding inheritance in the Koran, especially verses 11, 12, and 176 in Surah An-Nisaa. Allah SWT explains the distribution of inheritance, namely one-half, one-fourth, one-eighth, two-thirds, one-third, one-sixth, and so on.

Q.S An-Nisa	Rasio Fibonacci Retracement
1/2	0.5
1/3	0.33
1/4	0.25
1/6	0.16
1/8	0.125

2/3	0.66
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The inheritance distribution number found in Surah An-Nisa has its own value, mystery, and characteristics, in which the application of the inheritance distribution number and the theory coined by Leonardo Pisano have the same ratio. The distribution of inheritance included in the Golden Ratio is 12 (0.5), 1/3 (0.33), and 2/3 (0.66). These inheritance distribution numbers are the golden ratio in Fibonacci, and their application functions as statistical reference data for calculating probabilities, assessing the aesthetics of an object, and measuring buildings and web designs. If one traces the history of Islam, which appeared in 700 AD, and Leonardo Pisano, who appeared between 1175 and 1250 AD, it illustrates that the mystery, value, and usefulness of inheritance distribution numbers were conveyed through Leonardo Pisano, who appeared after the presence of Islam. This plot has wisdom in the form that the miracles of the Al-Qur'an, which have the nature of i'jaz (weakening the enemies of Islam), are real, which is implicitly explained by the Al-Qur'an and then explicitly revealed by the regularity of the universe.

CONCLUSION

Al-Qur'an as a source of knowledge has been able to answer doubts and human responses, which need to organize science and technology to be used for humans and humanity. In principle, Allah SWT has created nature to provide stimulation to humans so they can use their minds, think, and meditate. As Allah SWT's basic capital, He created humans as Allah's servants and caliphs on this earth. The findings of this study indicate that scientific facts in the Koran and current science are compatible. This is due to the fact that Islamic Science is derived from Allah SWT, who created the universe; of course, Allah knows more about the secrets underlying all of his creations. Therefore, there is no conflict between human inventions and the Koran or the hadiths of the prophets. In fact, both of them inspire people, pave the way for light against deadlocks, and provide scientific solutions to scientists and scientific researchers.

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