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THE HISTORY OF ISLAMIC SCIENCE AND ITS CHARACTERISTICS: A VALUABLE CONTRIBUTION TO THE DEVELOPMENT OF ISLAM IN MODERN TIMES

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Abstract

As a religion that encompasses comprehensive aspects of life, Islam has made important contributions to science throughout its history. The history of Islamic science dates back to the early Islamic enlightenment from the 7th to the 14th century AD. Strong emphasis was placed on the synthesis between science and religion. Scientific thinking and research were conducted with the understanding that knowledge of the universe was integral to an understanding of God's creation. Islamic science is characterised by an inclusive and multi-disciplinary approach. Muslim scholars of the time did not limit themselves to one particular field of science, but rather studied and developed knowledge in various disciplines such as mathematics, astronomy, medicine, physics, chemistry and philosophy. His valuable contributions to human civilisation. It also raises the question of how Muslims can combine the scientific heritage of Islam with the demands and challenges of the modern world, and how such a fusion can contribute to the sustainable and progressive development of Islam. As a result, the concept of Islamic science continues to be developed to this day.

Keywords: Islamic Science; History of science; Characteristics of science.

INTRODUCTION

In Islam, science has a broad meaning and is closely related to the search for knowledge, understanding, and scientific development that is beneficial to humans (Al-Attas, 1999). The understanding of science in Islam is based on the principles of Islamic theology which teach the importance of knowledge, and one's faith in Islam, science is considered as one of worldview to understand the creation of Allah SWT (Syed Muhammad Naquib Al-Attas, 1995). Scientific research and understanding of science as an effort to seek *haqq* (truth) of Allah's wisdom and majesty as the creator (Al-Attas, 1993). Therefore, science in Islam combines an approach between science and spirituality in acquiring knowledge.

Science in Islam is also considered as a form of worship. By studying all aspects of knowledge without violating the provisions of Islamic law and thoughts that have the potential to damage the Aqeedah of the Islamic religion, Muslims are expected to be able to use their knowledge for the benefit of mankind and as a way to get closer to Allah SWT. Therefore, science in Islam has a strong ethical dimension, which emphasizes the use of knowledge and technology for good and beneficial purposes for humans. Islam also does not only view knowledge as a useful knowledge but a very important tool to recognize and find al-Haqq (truth) about the essence of knowledge in Islam beyond what is in other religions, cultures and civilizations (Alfi, 2018).

in the 8th century to the 12th century AD, at this time, Muslims were in the golden age. The era in which Islamic science and civilization developed rapidly reached itis peak. At that time

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Muslims became world leaders because of their great attention not only to religious knowledge, but general sciences and pure sciences. At this time, very intelligent, active and reliable figures and scientists emerged, as mentioned, Al-Kindi (185 H/807M-260 H/873M), Al-Khwarizmi (d. 249 H/863M), Al-Razi (2551H/865M-313H/925M), AlFarabi (258H/870M-339H/950M), Ibn Sina (370H/980M-428/1037M), Al-Biruni (362H/973M-442H/1051M), Al -Ghazali (450H/1058M-505H/1111 M) (Rosyidi, 2016). So it is necessary to understand the meaning of science according to an Islamic perspective by looking at history during the golden age of Islam which gave birth to intelligent Muslim scientists by looking at the history and character or characteristics of the scientific disciplines of that era.

The author wants to describe how the development of science in Islam and its contribution so that the development of science exists in modern times by looking from a historical perspective between Islamic and western science which aims to prove that science cannot be separated from religion. This is different from the western understanding of science where the secularism happens between science and religion.

The method used by the author is a method of descriptive analysis techniques to investigate the history of Islamic science, its characteristics, and its valuable contribution to the development of Islam in modern times. This study aims to provide a detailed and systematic description of the development of Islamic science and to analyze its characteristics and its impact in the context of the development of Islam in modern times. qualitatively by referring to primary book sources and journals that explain or describe the history of the development of science in Islam and its contribution to modern times.

RESEARCH METHOD

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RESULT AND DISCUSSION

The Age of Prophet Muhammad Saw

Science has developed since the time of the Prophet Muhammad Saw. However, this knowledge is only in the form of applied knowledge for preaching and development of the Muslim community (Zakariya, 2018). After the Prophet's death, Islamic civilization expanded to various areas, especially Islamic science which developed during the peak of civilization from this science, during the golden age of Islamic civilization (Sari R et al, 2023). The following is the classification of the development period of the history of Islamic science and its characteristics and contributions to the modern period.

The development of the history of science in the Islamic context at the time of Rasulullah (7th century AD) can be understood through several aspects, including the Islamic view of knowledge and science, the influence of the social and cultural environment on the development of science, as well as the individual contributions of the companions of the Prophet Muhammad in science field (Nasr, n.d.).

The Islamic View of Knowledge and Islamic Science encourages its followers to seek knowledge and study the universe as a sign of the greatness of Allah SWT. In Islam, knowledge is seen as a means to know God and understand His creation. Prophet Muhammad Saw also encouraged his companions to seek knowledge, both in the field of religion and natural sciences (Nasr, n.d.).

During the Prophet's time, the epistemology of Islamic science was based on basic Islamic principles which included the belief in the oneness of Allah, revelation as the highest source of knowledge, and the importance of observation and reasoning as follows (Hasyim, 2018). First, the Oneness of Allah (*Tawhid*) Islam believes that Allah is the only God who created the universe and everything in it. This principle of the oneness of Allah forms the basis of the understanding of the universe which is ordered and regulated by Allah. Belief in the oneness of Allah is the basis for seeking and understanding scientific knowledge, by realizing that the universe is a sign of His greatness and power (Darmana, 2016). Second, Revelation as a Source of Knowledge: In Islam, revelation is considered as a highest source of knowledge. Al-Quran as God's revelation is the main guide in various aspects of life, including in the understanding of the universe and natural phenomena. Prophet Muhammad Saw also gave divine knowledge and guidance in various issues, including in the field of science. Therefore, in the epistemology of Islamic science, it is important to combine knowledge obtained from revelation with observation and rational reasoning (Mujahidin, 2017). Third, Observation and Reasoning In Islam, the Prophet Muhammad encouraged his people to observe the universe and use common sense in understanding natural phenomena. Observation and rational reasoning are considered as ways to gain knowledge about the universe created by Allah. In hadiths and narrations, the Prophet encouraged his friends to observe nature, study knowledge, and contemplate the signs of Allah's greatness in it (Khalid, A. S., Rahmadina, I., & Nur, 2020).

The contribution to the development of the history of science to the time of the Prophet came from its scientific basis, which came from revelation and then applied it to everyday life, for example, reckoning and rukyat. At the time of the Prophet Saw, the state of reckoning had not yet developed, especially the Hijriyah calendar, which at that time was only a month and date. As for the *rukyah* that was studied at that time when they were about to carry out the fast, the prayers were still observing the sky objects. At that time, the rukyah recorded by the hadith was the beginning of *Ramadan, Shawwal, Zulhijjah,* and *Muharram*. At the time of The Companions of Rasulullah (Sahaba) reckoning studies have developed, namely in the concept of a calendar that already uses year numbers. As for the study of rukyah, it is still like what the Prophet Saw did (Hidayat, 2019).

The Period of Integration of Greek Science with Islamic Values

During the expansion of Greek philosophy renewed by Muslim scientists, the epistemology of Islamic scientists became important in understanding the universe and attaining true knowledge. This epistemology includes methods of knowledge, sources of authority, and understanding of the nature of knowledge between the integration of faith and knowledge (Alfi, 2018). At that time, Muslim scientists believed that faith and knowledge were not contradictory, but complementary (Abduh, 2013). They believe that scientific knowledge and religious knowledge can be combined and not contradict each other.Therefore, Muslim scientists not only use rational and logical methods, but also seek spiritual and moral truths in the development of thought and knowledge.(Soleh, 2014) One of the links between Islamic scholarship and Greek philosophy is the Baitul Hikmah Library (Abduh, 2013).

The Baitul Hikmah Library has a very important role in the development of Islamic science and civilization during the golden age of Islam. This library became a center for spreading knowledge and a gathering place for scientists and researchers at that time. In addition, this library is also a place to translate scientific works from Greek and Persian into Arabic (Abduh, 2013). The Renewed Expansion of Greek Philosophy by Muslim Scholars refers to the period in which the thoughts and concepts of classical Greek philosophy were introduced, developed, and updated by Muslim scholars in the Islamic Golden Age. At that time, there was an intense interaction between Greek culture and Islamic thought, which resulted in significant developments in various fields of science and philosophy (Mufid, 2019).

First, Translation and Retranslation of Greek Works. At first, Muslim scientists made great efforts to translate classical Greek philosophical and scientific works into Arabic. This translation involved works by philosophers such as Plato, Aristotle, and Neoplatonism, as well as scientists

such as Ptolemy and Galenus. This process of translation enabled the spread of Greek thought to the Muslim world, thus starting the development of Islamic philosophy. (Oliver Leaman, 1988) Second, the Assimilation and Reinterpretation of Greek Thought. Muslim scientists not only translated Greek works, but also assimilated and reinterpreted Greek thought in an Islamic context. They tried to unite the principles of Greek philosophy with Islamic teachings, seeking commonalities and overcoming differences. For example, Muslim Scholars such as Al-Farabi, Ibn Sina (Avicenna), and Ibn Rushd (Averroes) developed thinking in the fields of ethics, metaphysics, and logic by combining elements of Greek philosophy with Islamic concepts (Ibrahim Madkur, n.d.). Third, the Islamization of Science. One of the important contributions of Muslim scientists is their efforts to develop science with religious teachings. They try to find a filter between philosophical thoughts that are adapted to Islamic law, and assume that scientific knowledge and religious knowledge can complement each other. This thought influenced the Islamic perspective on science and became the basis for the development of science in the Islamic tradition (Soleh, 2014). So that many Muslim scientists have created scientific concepts and new thoughts at that time by adapting to Islamic law.

Here are some additional examples of Muslim scientists' contributions in developing Greek philosophical thought as follows. (Abqary, 2010) First, Al-Farabi. Is a Muslim scholar figure who assimilated the thoughts of Plato and Aristotle into the Islamic tradition (Watt John, 2016) and developed political concepts, including the concept of the ideal state in his work "*Al-Madina al-Fadila*" (The Virtuous City) (Pancawati, 2018) and introduced the concept of moral and spiritual perfection related to concepts of Greek philosophy and developing political theory and developing political theory and social philosophy in an effort to create an ideal society by emphasizing the importance of education and knowledge in forming a good society (Putri, 2020). Second, Ibn Sina. Is a Muslim scholar figure who combines Aristotle's thought with Neoplatonic thought, develops the concept of the existence of God and its relation to the material world in his works "Kitab al-Shifa" (The Book of Healing) (Mughal, 2011) and "Kitab al-Isharat" (The Book of Directives) and developed rational method and logic in philosophy and medical science.Third, Ibn Rushd. Is a Muslim scholar figure who assimilated Aristotle's thought and gave a different interpretation of his teachings, wrote commentaries on Aristotle's works, including "Tafsir al-Ma'qulat" (The Commentary on the Metaphysics) and "*Tafsir al-Nafs*" (The Commentary on the Soul) and develop concepts about reason, science, and their relation to religion in Islamic philosophy.

Fourth, Al-Kindi. Is a Muslim scientist figure who translated Greek philosophical works into Arabic, including the works of Plato and Aristotle, developed ideas about the relationship between science, truth and religion, introduced the scientific method and rational thinking in the fields of mathematics, astronomy and physics, developed concepts in logic and metaphysics based on Aristotle's thought, adopted the deductive method in philosophical thought, wrote works on theology, natural philosophy, and mathematics.Fifth, Ibn al-Haytham. Is a Muslim scientist figure who developed the science of optics based on his research on classical Greek thought, especially the work of Ptolemaeus, wrote the monumental work "*Kitab al-Manazir*" (The Book of Optics) (Sabra, 1994) which was influential in the field of optics and scientific method.Sixth, Al-Ghazali. Is a Muslim scholar figure who bridges Greek thought with Islamic tradition through his work "*Tahafut al-Falasifah*" (The Incoherence of the Philosophers) (Jones, 2020) and tries to integrate religious and philosophical teachings in an effort to build a holistic understanding.Lastly, Ibn Khaldun. Is a Muslim scientist figure who developed social and historical theory in his work "Muqaddimah" which made major contributions to the field of sociology and history and considered social and economic factors in understanding civilization and social dynamics.

The Contribution of Islamic Science to Modern Science

The concept of epistemology in Islam is essentially inseparable from its theological dimension which is monotheistic in nature (Hamid Fahmy Zarkasy, 2005). In modern times, the development of western findings cannot be separated from the results of Islamic scientific concepts that have been developed by previous Islamic researchers (A. Wahid, 2014). Historically, the Islamic intellectual tradition has made a significant contribution to the development of science and

epistemology (Asep Ahmad Sukandar,Muhammad Hori, 2020). During the heyday of Islamic civilization in the Islamic Golden Age, Muslim scholars such as Ibn Sina (Avicenna), Al-Farabi, and Ibn Rushd (Averroes) have developed ideas about epistemology and scientific methodology. These thoughts have continued to this day with efforts to interpret and apply epistemological principles in the context of modern science.

Since the last few decades, science and technology have experienced rapid progress in various fields, and this also applies to science in the Islamic context. Science of Islam, or also known as Islamic science or Islamic science, is an attempt to integrate Islamic values with scientific methods and knowledge in which the West uses Islamic scientific concepts to create technology, while the West uses concepts from Islamic scholarship, the West also create a new understanding by separating Islamic religion from science, through education, film and entertainment, so that religious knowledge, in contrast to science, which is a challenge to Islam itself in modern times, is Western Modernity. Al-Attas highlights the influence and impact of Western modernity on the thinking and life of Muslims (Al-Attas, 1993). He saw the social and cultural changes brought about by modernity as a threat to Islamic values and identity. His criticism of the separation of knowledge, secularism and materialism in Western thought provided the basis for developing his view of Islamic epistemology which includes religious aspects (Kania, 2017). The following is the result of Islamic scientific concepts developed by the West to the present as follows.

First, Ibn Sina wrote the book Al-Qanun fi al-Tibb (Canon of Medicine). This book became the main reference in the medical world and became one of the largest medical encyclopedias of its time and had a major impact on the development of medical science in European universities in the 20th century. 12th to 17th. Second, Khwarizmi. The concept of the number zero (0), introduces the concept of algebra and the result of western development is the binary number system (computer programming). Third, Ibn al-Haytham, wrote an influential book in the field of optics which influenced the development of modern optical science which was the result of western development, namely the camera. Fourth, Al-Biruni. Writing the books "Kitab al-Tafhim" (The Book of Instruction in the Elements of the Art of Astrology) and "Kitab al-Jamahir fi Ma'rifat al-Jawahir" (The Book of Precious Stones), are still important sources for the study of and research. Fifth, Abbas Ibn Firnas. A 9th century Muslim scientist famous for his experiments on human flight. He built wings and tried to fly by using a layered cloak which became the result of Western development is the Airplane. Finally, Ibn al-Nafis, a 13th century physician and anatomist who put forward a theory of blood circulation that was more accurate than Galen's theory which was dominant at the time (Jailani, 2018).

CONCLUSION

The epistemology of science and its characteristics in the Islamic perspective in each era has different developments, at rasulullah's age the development of science are depending so mcuh on a revelation, however rasulullah still calls out his ummah to seek a scientific knowledge using their reasoning. At the era of abbasiyah, the muslim scholars are integrating between a greek philosophy and islamic principals. And it becomes a pioneer of a modern sciences. At the modern era, muslim science are havimg some setbacks. Muslims scholars aren't producing a scientific works as much as abbasiyah era, they struggles more in religious fields than in the scientific fields. However muslim scholar never forget the basic sources of early knowledge which originating from revelation as a filterlization of defects in the erroneous understanding of thinking that makes a civilization of Islamic science damaged, the existence of modernity from the west, which create a new understanding, which separates religion and science and the lack of Muslims in modern times only focusing on science and worship so they are not prepared to prevent this understanding of western modernity .

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