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Islamic Intellectual Heritage: Philosophy as the Foundation of Scientific Advancement

Namiyah Fitriani, UIN Maulana Malik Ibrahim Malang
Hadi Masruri, UIN Maulana Malik Ibrahim Malang

namiyahfitriani@gmail.com (coresponden)

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Abstract

This study examines the role of Islamic philosophy as the foundation for scientific progress in Islamic civilization, focusing on the post-translation period from al-Kindi to the golden age of Ibn Sina and al-Ghazali. The research aims to analyze how the integration of rational-philosophical thought with Islamic revelation contributed to advancements in astronomy, mathematics, and medicine, which later influenced the European Renaissance. Using a qualitative approach with library research methods, this study collects and analyzes data from books, journals, and relevant texts through descriptive analysis, including data reduction, presentation, and conclusion drawing. The findings reveal that Islamic philosophy provided epistemological, ethical, and ontological frameworks that facilitated scientific innovation, as seen in the works of scholars such as Ibn Sina, Al-Khwarizmi, and Al-Razi. The study also highlights the influence of Islamic thought on Western scholars like Copernicus and Roger Bacon, reinforcing the interconnectedness of philosophy and empirical science in Islamic tradition. These results align with scholars like Osman Bakar and Oliver Leaman, who emphasize the autonomous development of Islamic philosophy beyond Greek influences. The implications suggest the need for a reintegration of philosophical inquiry with modern scientific research to restore a holistic approach to knowledge.

Keywords: *Islamic philosophy, scientific advancement, European Renaissance*

Abstrak

*Penelitian ini mengkaji peran filsafat Islam sebagai landasan kemajuan ilmu pengetahuan dalam peradaban Islam, dengan fokus pada periode pasca-terjemahan dari al-Kindi hingga masa keemasan Ibnu Sina dan al-Ghazali. Tujuan penelitian adalah menganalisis bagaimana integrasi pemikiran rasional-filosofis dengan wahyu Islam berkontribusi pada kemajuan astronomi, matematika, dan kedokteran, yang kemudian memengaruhi Renaisans Eropa. Dengan pendekatan kualitatif dan metode studi kepustakaan (*library research*), penelitian ini mengumpulkan dan menganalisis data dari buku, jurnal, dan teks terkait melalui analisis deskriptif, meliputi reduksi data, penyajian data, dan penarikan kesimpulan. Temuan menunjukkan bahwa filsafat Islam menyediakan kerangka epistemologis, etis, dan ontologis yang mendorong inovasi ilmiah, seperti terlihat dalam karya Ibnu Sina, Al-Khwarizmi, dan Al-Razi. Penelitian ini juga mengungkap pengaruh pemikiran Islam terhadap ilmuwan Barat seperti Copernicus dan Roger Bacon, memperkuat keterkaitan antara filsafat dan sains empiris dalam tradisi Islam. Hasil ini sejalan dengan pandangan Osman Bakar dan Oliver Leaman yang menekankan perkembangan otonom filsafat Islam di luar pengaruh Yunani. Implikasinya menunjukkan perlunya reintegrasi filsafat dengan penelitian ilmiah modern untuk mengembalikan pendekatan holistik terhadap ilmu pengetahuan.*

Kata Kunci: *Filsafat Islam, kemajuan sainsRenaisans Eropa*

A. Introduction

Post-translation Islamic philosophical thought was first introduced by al-Kindi (801–873 AD). In his book Primary Philosophy, he explains the scope of philosophy and criticizes its opponents. However, due to the dominance of fuqaha and the lack of philosophical references at that time, his thoughts received little response. Even so, al-Kindi inherited three philosophical issues that are still relevant: (1) the creation of the universe, (2) the immortality of the soul, and (3) God's knowledge of astrology.(Wahyuningsih, 2021a) Islamic philosophy is a systematic Muslim thought about various aspects of life and the universe based on Islamic teachings. Scholars such as Madkur, Al-Ahwany, and Al-Iraqy define it as: (1) an intellectual response to the challenges of the times, (2) an Islamic-based study of nature and man, and (3) encompassing various Islamic disciplines as well as pure philosophical thought. This thought comes from the inspiration of the Quran and Hadith.(Lingga et al., 2023)

The process of translating Greek philosophical works into Arabic was also discussed, which became the foundation for the development of philosophical thought. Important figures such as al-Kindī, Saadia Gaon, al-Rāzī, and al-Fārābī are studied to explore their roles in the field of philosophy and science. In addition, the connection between philosophy and Jewish tradition and vision theory is also highlighted. Aesthetic aspects are examined through the relationship between music and philosophy, while ethical works in the Arabic tradition are analyzed to reveal moral values. The development of philosophy during the Būyid Dynasty and the Ashʿarī thought on Divine power are also discussed. Finally, the contributions of Avicenna and al-Ghazālī, along with their critiques of philosophy, provide a comprehensive understanding of the origins of the formation of philosophical thought in the Islamic context as well as the dynamics of interaction between rich intellectual traditions.(Inayahtulfatiha & Hanafi, 2025)

Muslim philosophers defended their philosophical thinking by pointing out the harmony between Greek philosophy and Islamic teachings. They refer to the Quran, finding terms such as "philosophy" (derived from the translation of Greek texts) and "ḥikmah" (wisdom) associated with philosophical traditions. Thus, philosophy in Islam is not only rational but also has a religious basis.(Ramadhani, 2020) In the history of Islamic philosophy, there is a debate between the use of the terms Islamic philosophy or Arabic philosophy. The term Arabic philosophy refers to the number of Arab philosophers who wrote in Arabic, with a mixture of Aristotelian and Neo-Platonist thought from the era of Greek translation of works in the Abbasid period. However, in fact many Muslim philosophers came from outside Arabia, such as Persia, Andalusia, and even modern countries such as Turkey, India, and Indonesia. Therefore, the term Islamic philosophy is more appropriate because it encompasses the geographical diversity and scientific traditions in Islamic civilization. (Abror, 2020)

Islamic philosophy is an important part of the treasure trove of Islamic thought with complex developments. A lack of understanding of its aspects often leads to misjudgments, including anti-philosophical assumptions or claims that Islamic philosophy originated only in Greece. Oliver Leaman rejects the argument that Islamic philosophy originated from the translation of Greek texts, contrary to the accusations of Renan (Aristotelianism) and Duhem (Neo-Platonism). Islamic philosophy has independent roots and development in the Islamic tradition.(Wahyuningsih, 2021b)

Islamic philosophy is the embodiment of the ability to think deeply based on the autonomous grace of God. In the analogy of technology, reason plays the role of hardware while philosophy as software, both complement each other for devotion to God. Islamic philosophy has a dual role: as a tool for interpreting revelation (tafsir-hadith) and as a guide for practical decision-making. Its position is central in Islam because it harmoniously combines revelation and reason. Through ijtihad – a

comprehensive philosophical method of thinking – Muslim thinkers optimize the role of reason to realize Islam as a universal grace that is relevant in all times and places.(Kanafi, 2019)

The decline of science in the Islamic world is closely related to the rejection of philosophy, as revealed by Prof. Osman Bakar. In fact, history shows that the glory of Islamic science actually began with the development of philosophy in the 8th to 15th centuries, when philosophers such as Ibn Sina and Al-Biruni combined empirical research with the inspiration of the Qur'an. At that time, physics and metaphysics were still integrated in philosophy. The separation of science from philosophy began after the Western scientific method (Descartes/Bacon) prioritized experimental verification. While encouraging technical advances, this approach eliminates the philosophical framework that was once the strength of Islamic science. Three critical notes need to be considered regarding this shift.(Bagir, 2020)

Schematically, the position of Islamic philosophy can be described as follows: First, the separation of science from philosophy not only eliminates the opportunity for science to tap into rich philosophical insights, but also detaches science from the transcendental and religious dimensions inherent in philosophy. At the very least, science has lost the ethical foundation that has been an integral part of philosophical thought. (In fact, in the end, this separation is also detrimental to philosophy itself). Second, in essence, science has never been completely separate from philosophy, especially metaphysics. What is happening is simply a shift from transcendental metaphysics to metaphysics that is secular in many respects. Third, the negative impact of this separation is not limited to the loss of the benefits of cosmology and philosophical ontology for science, or the loss of philosophical guidance in the ethical (axiology) aspect of the development of science, but it is also detrimental to the epistemological field.

This research is interested in exploring how Islamic philosophy played a role as the foundation of scientific progress in Islamic civilization, focusing on the post-translation period of Greek works by al-Kindi to the golden age of Ibn Sina and al-Ghazali. This study will analyze the unique integration of rational-philosophical thought with Islamic revelation, as well as its impact on the developments of astronomy, mathematics, and medicine that influenced the European Renaissance.

B. Methods

This research uses a qualitative method with a library research approach. This approach was chosen because it is able to explore social phenomena comprehensively, especially in studying Islamic Intellectual Heritage with a focus on the role of philosophy as the basis for the development of science. The object of this research centers on the analysis of Islamic intellectual heritage. The data collection process is carried out through exploration of various written sources such as books, journals, and other related documents. The data that has been collected is then analyzed using descriptive methods, which include three main stages: (1) Data reduction, namely filtering out information that is less relevant to obtaining core data. (2) Data presentation, namely organizing data that has been filtered in a systematic and easy-to-understand format. (3) Drawing conclusions, namely formulating the findings of the analysis to provide a complete understanding of the object of research (Rukin, 2021). With this approach, this research aims to provide an in-depth interpretation of the relationship between Islamic philosophy and the advancement of science in Islamic civilization.

C. Result and Discussion

The contribution of Muslim scholars from the classical and medieval eras to the development of knowledge in various disciplines was significant. They made outstanding contributions in astronomy, alchemy, physics, philosophy, medicine, mathematics, sociology, and many other sciences. (Gyagenda,

2024) In his notes, Copernicus acknowledged the impact of Arab scholars on his heliocentric model by stating, "I adopted the method that had been perfected by Islamic scholars." (Mir & Anjum, 2025) This is one proof that Islamic scholarship is very influential on countries in Europe:

a. Philosophy

The famous Arab philosophical movement, led by Abu Yusu Ya'qub ibn Ishaq al-Kindi (800-870 AD), translated and analyzed the works of Aristotle and Greek scientists, emphasizing that the Quran encouraged the development of worldly knowledge alongside the understanding of revelation. Subsequent Muslim philosophers, such as Al-Farabi and Ibn Sina, also maintained this view and made significant contributions to the fields of natural science, mathematics, medicine, and philosophy.(Hefner, 2020) The rise of the Renaissance in the West cannot be separated from the influence of Islamic philosophers, especially the influence of Ibn Rushd, known in the West as Averroes. By the middle of the 13th century all of Ibn Rushd's books were translated into Latin and had been studied in various Colleges in Europe, especially in western Europe. Westerners cannot delve into Yunāni thought, without going through Islamic figures.

According to Amin(Amin, 2024) the Islamic philosophers who influenced Islamic civilization in western countries are: (1) Abu Bakr Muhammad bin al-Sayyigh, better known as Ibn Bajjah. Historians view him as a knowledgeable person who mastered no less than twelve fields of science. He is aligned with the philosophical figure Ibn Sina and can be categorized as the main and first figure in Spanish Arabic philosophy and the successor of his philosophical thought is Ibn Thufail. (2) Abu Bakr ibn Thufail, better known as Ibn Thufail. He wrote extensively on medicine, astronomy and philosophy. His philosophical work, which is famous until now is Hay ibn Yaqzhan.(Amin, 2024) (3) Ibn Rushd of Cordova. In the west he is known as Averoes. Ibn Rushd's greatness appears in his works which always divide his discussion into three forms, namely commentary, criticism and opinion. In particular, his criticism and commentary on the works of Aristotle made him very famous in Europe. So that his comments on Aristotle's philosophy had a major influence on the awakening of European scientists and could form a flow that was attributed to him, namely the flow of Averroism.(Matondang, 2021)

b. Mathematics

Muslim scholars developed a new, more practical number system, which led to the introduction of Arabic numerals. They also invented the number zero, which simplified the calculation process as the addition of a zero on the right side of a number would result in a power-of-ten value. This helped ease the burden of calculating large numbers.(Gyagenda, 2024) A number of Muslim mathematicians such as Mahmud bin Musa Al- Khawaritzmi who first discovered calculation (al-Jabar), geometry and Trigonometry which is the basis for the development of the science of hishab. Similarly, Umar Al-Khayyam and Al-Thusi are Islamic scholars who discovered numbers starting from zero.(Sianipar & Anwar, 2023) Al-Khwarizmi's contribution to mathematics was his strong support for the Hindu numeral system (1-9 and 0), which he recognized as having the power and efficiency necessary to revolutionize mathematics in the Islamic world and the West. (Maulidina & Fahmy, 2022)

c. Medicine

Islamic scholars prioritized the study of medicine among Greek sciences. The medical school in Jundishahpur, Persia, emerged as the largest center for medical education in the Islamic world between the seventh and ninth centuries. There, Islamic doctors first studied the works of Hippocrates, Galen, and other Greek physicians, while also being exposed to medical knowledge from Byzantium, Persia, India, and China. Medical science developed rapidly with many health experts and the establishment of pharmaceutical institutions both in Cordova and in Baghdad. in this science the Muslims followed Greek authors and then made rapid progress which influenced the Renaissance in Europe (Nafi'i & Imtihanah, 2020).

One of the popular figures of his time who was an expert in the medical field was Ibn Sina who authored the book "Al-qanun fi at-thib" which is a discovery recognized by the world, especially in medical science. Al-qanuun fi al-thibb is a book containing findings that study medicine and about human organs as well as types of diseases, causes of disease and how to treat them.(Hermawansyah et

al., 2024) Ibn Sina is a scientist and philosopher who studied a lot of science both physics, mathematics, medicine and law and philosophy. His real name is Abdullah Al-Hasan Bin Al Bin Sina who was born in 370H/980M precisely in the month of shafar in Persia, then died in 692H.(Taufiq et al., 2025) Al-Qanun's work as a discovery that made a major contribution to medical science is still a reference for doctors today. The figures who studied this science who were also doctors in their day were Al-Razi, Ibnul Al-Jazzar, Al-Zahrawi and Ibn Sina. Cometherapy is a way for doctors to kill cancer cells using chemicals.(Hermawansyah et al., 2024)

Among the many most influential Islamic civilizations is medical science. There are several Islamic scholars who are experts in medicine. (Pandi et al., 2023) Abu Bakr Ibn Zakaria Al-Razi, known in the West as Rhases, He had been a prominent scientist whose influence had extended beyond the Muslim world, reaching Europe. He had written more than 200 books, with about half of them focusing on medicine, while the rest had covered philosophy, theology, mathematics, astronomy, and chemistry. (Ahmed et al., 2024)

Ibn Sina (980-1037 AD), in the West known as Avicenna, has written a manual on medicine (Canun Fi l-Tib), the book contains five things namely; physiology, hygiene (hygiene), pathology, therapy and medicinal materials. He also wrote a book on the treatment of liver diseases, medicinal leaves containing 760 types of medicine. This book was printed in Rome in 1593 and was influential for the development of medical science in the Western world and was used until the 19th century in European universities. Ibn Sina stated that he had reached the pinnacle of knowledge in the field of medicine that was hard to describe at the age of 16 due to various treatments and clinical experiences he had had. (Ghaffari et al., 2022)Ibn Sina's career and work were inspiring as he gathered knowledge from different parts of the world, emphasized the practical application of medical principles to cure patients, and preserved and disseminated his knowledge for the advancement of medicine.

One of the most popular sciences in the West is astronomy and mathematics. There are two most influential Muslim scientists such as: (1) Al-Farrazi and Umar al-Khayyam were scholars of Islamic astronomy. They authored books on astronomy, which were translated into Latin to be taught in the West. Observatories were established in Seville and various cities in Andalusia. Umar Al-Khayyam's calendar was far more accurate than that of Gregory who made a difference of 1 day in 350 years. While Umar al-Khayyam made a difference of 1 day in 5000 years. (2) Hassan Ibn Haitan (905-1039 AD), an astronomer and mathematician from Cairo, as the inventor of optics which served as the basis for finding binoculars and photography. Similarly, it became the basis for Western scientists, Roger Bacon and Kepler in inventing the telescope and microscope. (Sianipar & Anwar, 2023)

The findings of this study directly address the original research question regarding the role of Islamic philosophy as the foundation for scientific progress in Islamic civilization, particularly during the post-translation period from al-Kindi to the golden age of Ibn Sina and al-Ghazali. The results demonstrate how the integration of rational-philosophical thought with Islamic revelation facilitated groundbreaking advancements in astronomy, mathematics, and medicine, which later influenced the European Renaissance. Scientifically, this can be interpreted as evidence of the symbiotic relationship between metaphysical inquiry and empirical investigation, where philosophical frameworks provided the ethical, epistemological, and ontological foundations for scientific exploration. These findings are consistent with the works of scholars such as Osman Bakar and Oliver Leaman, who emphasize the autonomous development of Islamic philosophy within the Islamic tradition, rather than merely being a derivative of Greek thought. However, this study further highlights the specific mechanisms by which philosophical concepts were operationalized into scientific practice, a dimension less emphasized in existing literature. The observed consistency with historical accounts of Western scholars like Copernicus and Roger Bacon acknowledging Islamic influences reinforces the validity of these findings, while the detailed analysis of interdisciplinary integration (e.g., Ibn Sina's medical works incorporating Aristotelian logic and Quranic principles) offers a novel perspective on the holistic nature of Islamic scientific tradition.

D. Conclusion

This study concludes that Islamic philosophy served as a fundamental pillar for scientific advancement in classical Islamic civilization, bridging rational inquiry with divine revelation to foster breakthroughs in astronomy, mathematics, and medicine. The works of thinkers like al-Kindi, Ibn Sina, and al-Ghazali demonstrate how philosophical frameworks grounded in Islamic theology provided ethical, epistemological, and metaphysical foundations for empirical research, which later influenced European Renaissance scholars. The findings challenge the notion that Islamic philosophy was merely derivative of Greek thought, instead highlighting its unique synthesis of reason and faith. However, the subsequent separation of science from philosophy in the modern era has led to a loss of holistic scientific inquiry. Future research should explore pathways to reintegrate philosophical and ethical dimensions into contemporary scientific practice, ensuring a balanced approach that aligns with Islam's intellectual heritage while addressing modern challenges.

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