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COMPARATIVE ANALYSIS: THE SCIENTIFIC CULTURE OF THE 9TH CENTURY ABBASID DYNASTY AND THE 10TH CENTURY FATIMID DYNASTY

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Abstract

This article examines the comparison of scientific culture between the Abbasid Dynasty and the Fatimid Dynasty, two great caliphates that significantly influenced the development of Islamic science. The Abbasid Dynasty was great with the House of Wisdom they established as an intellectual center for advancement in the fields of astronomy, mathematics, medicine, and philosophy. On the other hand, the Fatimid Dynasty, through the establishment of Al-Azhar, contributed to the field of education, particularly in Ismaili theology and religious philosophy. This study aims to compare the two dynasties in their roles in the development of science, with a primary focus on their approaches to natural and spiritual sciences. The method used in this study is the historical method, which consists of four main stages, namely heuristics, criticism, interpretation, and historiography. The results of the comparative analysis show that although both dynasties made significant contributions to science, they differed in their scientific orientation, influenced by their respective political and theological contexts. Ultimately, these two centers of knowledge in the 9th and 10th centuries provide insight into intellectual heritage and have had a major impact on Islamic civilization in particular and the advancement of science in general.

Keywords: Al-Azhar; Abbasid Dynasty; Baitul Hikmah; Fatimid Dynasty

INTRODUCTION

The Abbasid dynasty (750-1258 CE) and the Fatimid dynasty (909-1171 CE) were two major caliphates in Islamic history that significantly influenced the development of scientific culture. Although both were centred in different regions and emerged in different political contexts, both played an important role in shaping the intellectual tradition of the Islamic world. During the Abbasid Dynasty, the city of Baghdad became a centre of civilisation known for the establishment of the Baitul Hikmah (House of Wisdom), an institution that served as a centre for translation and scientific research (Algeriani & Mohadi, 2019). Here, scientists from different ethnic and religious backgrounds collaborated to translate and develop knowledge from various traditions, including Greece, Persia, and India. Significant contributions in the fields of mathematics, astronomy, medicine, and philosophy were born from this institution, with figures such as Al-Khwarizmi, Al-Razi, and Al-Farabi playing essential roles in the advancement of science at that time (Wang, 2024). Meanwhile, the Fatimid dynasty, based in Cairo, established Al-Azhar in 970 AD as a centre of higher education. Although initially established as a religious educational institution, Al-Azhar later developed into a university offering various disciplines, including theology, law, and philosophy. Under Fatimid patronage, Al-Azhar became an intellectual centre that attracted scholars from across the Islamic world (Abdullah & Jinan, 2024).

Although both dynasties contributed greatly to the development of science, their approaches to scientific culture show interesting differences. The Abbasids put more emphasis on translating and developing knowledge from the Greek and Indian traditions (Efendi, Hadi, & Reveny, 2025). In comparison, the Fatimids focused more on developing knowledge within the context of Islamic theology and law (Manggala, Syihabuddin, & Kholil, 2025). These differences

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reflect differences in the political and theological orientations of each dynasty that influenced their educational and scientific policies.

Several studies discuss the same topic, such as "Sejarah Pendidikan Islam Pada Massa Dinasti Fatimiyah Di Mesir (909-1171 M)", This article was written by Muhammad with a specific discussion topic on how the Fatimid dynasty played an important role in the establishment and development of science in Cairo, Egypt at that time (Muhammad, 2020) . Other writings, such as "Transformasi Intelektual Islam Atas Dunia Barat", this article analyzes the significant contributions of Islamic civilization to the intellectual awakening of the West from the Middle Ages to the modern era. This study focuses on discussing how science, technology, and cultural values were transferred from the Islamic world to the West (Afandi & Khobir, 2025). Next is an article titled "From Bayt al-Hikmah to Algebra: The Intellectual Legacy of the Islamic Golden Age." The main focus of this article is to review the golden age of Islamic intellectual history, which originated from Bayt al-Hikmah, and its influence on global progress (Rahman & Sudirman, 2024). Similar literature includes "Perbandingan Sistem Pendidikan pada Masa Dinasti Umayah dan Sistem Pendidikan pada Masa Dinasti Abasiyyah (Analisis Komparatif dengan Pendekatan Historis)". The focus of this article is to compare the education systems implemented by the Umayyad and Abbasid dynasties (Wiranata, R Z Ricky Satria Abidin, 2021).

From the literature review above, it is clear that this research is necessary as a complement to the novelty it offers, namely a comparison of the scientific cultures of the Abbasid dynasty in the 9th century and the Fatimid dynasty in the 10th century. Therefore, the purpose of this study is to analyze and compare the academic cultures of the Abbasid and Fatimid dynasties, focusing on their contributions to the development of science and the role of the educational institutions they established. Through this comparative analysis, it is hoped that a deeper understanding of the intellectual heritage of these two dynasties and their influence on Islamic civilization and the world as a whole can be obtained.

RESEARCH METHOD

This research employs the historical method, which consists of four main stages: heuristics, criticism, interpretation, and historiography (Kuntowijoyo, 2013). Heuristics is the first stage involving the collection of relevant historical sources, both primary and secondary. Such sources include the works of scholars from the Abbasid and Fatimid dynasties, such as Al-Khwarizmi, Al-Razi, and other significant figures, as well as texts related to Baitul Hikmah and Al-Azhar. The second stage is criticism, which aims to verify the authenticity and reliability of these sources. At this stage, researchers ensure that the sources are authentic and originate from the relevant period while assessing the information's accuracy.

After that, during the interpretation stage, the researcher analyses and interprets the verified sources to grasp the historical context and the influence of the scientific policies implemented by the two dynasties. This research will evaluate how both dynasties supported scientific development through their educational institutions, focusing on the differences in scientific orientation between the Abbasids, who advanced natural sciences, and the Fatimids, who emphasised theology and religious philosophy. Finally, historiography is employed to compile a historical narrative based on the obtained findings and analyse how the history of these two dynasties has been recorded and understood across various periods. Through these four stages, this research aims to provide a comprehensive picture of the comparative scientific culture of the Abbasid and Fatimid dynasties, as well as their contributions to the advancement of science in the Islamic world (Kuntowijoyo, 2013).

The data sources in this research include historical books, journal articles, and sources related to Baitul Hikmah and Al-Azhar. The analysis method employed is comparative analysis, which aims to identify similarities and differences in the scientific cultures of the two dynasties. This analysis will compare the scientific contributions of each dynasty, particularly in the development of science and education, and examine how the political and theological contexts influenced the scientific policies implemented by each caliphate.

RESULT AND DISCUSSION

Table 1. Comparison Result

Aspects	Comparison Between Abbasid and Fatimid	
	Baitul Hikmah (Abbasid)	**Al-Azhar (Fatimid)**
Location	Baghdad, Iraq	Cairo, Egypt
Period of Establishment	786-809 M	970/972 M
Founder of	Caliphs Harun Al-Rashid and Al-Ma'mun	Caliph Al-Mu'izz li-Din Allah
Main Focus	Translations and scientific research in various disciplines	Religious and secular education
Key Contributions	Translation of scientific works from Greece, Persia, and India into Arabic	Development of Islamic higher education and integration of religious and secular sciences
Sustainability	Destroyed in 1258 by Mongol Forces	Still functions today as a leading university in the Islamic world

Baitul Hikmah and Al-Azhar are two important institutions in the history of Islamic civilization, each with unique characteristics and missions, yet complementary to one another. Baitul Hikmah, located in Baghdad, was founded by Caliph Harun al-Rashid as a library and translation center, then rapidly developed into a major intellectual and scientific center under his son, Caliph al-Ma'mun (around 813 AD), making it a symbol of the Islamic Golden Age. This institution became a center where the important works of classical thinkers such as Aristotle, Plato, Euclid, and Ptolemy were translated into Arabic, bridging historical knowledge with future understanding. The intellectual environment at Baitul Hikmah was greatly influenced by Mu'tazilah culture, which emphasized rationalist theology, stressing the importance of logic and empirical observation. This spirit gave rise to prominent figures such as Al-Khwarizmi, known as the Father of Algebra, the Banu Musa brothers, who played an important role in the development of mechanical engineering, and Hunayn ibn Ishaq, a Christian scholar who was skilled in facilitating the translation of Greek medical and philosophical texts (Al Farabi, 2016).

In contrast to the emphasis on scientific and philosophical inquiry in Baghdad, which was established by the Fatimid Caliph Al-Mu'izz li-Din Allah by ordering the construction of Al-Azhar Mosque in Cairo as the main mosque for the new Fatimid capital (Cairo), although the physical construction was carried out by the Fatimid commander, Jauhar al-Siqilli, around 970-972 AD. Al-Azhar then developed into a world-renowned center of Islamic education, becoming part of the university now known as Al-Azhar University. Al-Azhar in Cairo served as the guardian of theological studies. Baitul Hikmah focused on specialized research, while Al-Azhar was established to foster a religious elite equipped with solid doctrinal knowledge. Over time, especially after the conquest by Saladin, these institutions developed into established Sunni institutions. The main emphasis shifted to the mastery of Fiqh or Islamic law in various schools of thought, the development of Nahwu to standardize Arabic grammar in order to preserve the integrity of the Qur'an, and the examination of Kalam to protect Islamic principles from external philosophical distortions. (Muhammad, 2020).

The structural and institutional foundations of these two entities differed significantly. Baitul Hikmah emulated the structure of the Sassanid Persian imperial library, emphasizing the concept of a place for storing books. However, its heavy dependence on direct support from the Caliph made this institution vulnerable. With the weakening of the Abbasid central authority and the fall of Baghdad to the Mongols in 1258, Baitul Hikmah disappeared from the historical record. In contrast (Sari, 2025) Al-Azhar implemented the Mosque-University model, combining worship

spaces with classrooms—a structure that later influenced the establishment of universities in Europe. Al-Azhar's continuity was ensured by an independent waqf system, allowing the institution to survive through various regime changes, from Mamluk to Ottoman, for over a thousand years (Faizah & Faridi, 2024).

The Role of Baitul Hikmah and Al-Azhar in The Development of Science

The establishment of the Abbasid Dynasty was a crucial moment in Islamic civilization, shifting the focus of power from geographical expansion to strengthening intellectual foundations. This change began in 750 AD, when the descendants of Abbas bin Abdul Muthalib overthrew the Umayyad Dynasty in a revolutionary movement that began in Khurasan. This change significantly influenced sociology, as the Abbasid Dynasty adopted a more inclusive model of government for the Mawali, especially the Persians, who brought a tradition of bureaucracy and a love of knowledge to the center of Islamic power (Hitti, 2024). The crucial moment that facilitated this intellectual advancement occurred when Caliph Al-Mansur moved the capital from Damascus to Baghdad in 762 AD. Baghdad was established as a center of civilization, where a cultural fusion between Arab, Persian, Greek, and Indian traditions began. Since the era of Al-Mansur, the palace served as a gathering place for translators of ancient manuscripts, especially in the fields of astronomy and medicine. The caliph's goal of understanding natural phenomena and improving public welfare through medical research sparked a well-organized translation movement (Syalabi, 1983).

The peak of this intellectual fervor was reflected in the establishment of Baitul Hikmah. The Baitul Hikmah in Baghdad, as a centre of translation and research during the Abbasid Dynasty, played a crucial role in the development of science, especially during the Islamic Golden Age. Founded by Caliph Harun al-Rashid at the end of the 8th century, Baitul Hikmah initially served as an extensive library that stored various scientific works (Hidayat, 2024). However, during the time of Caliph al-Ma'mun (813-833 CE), it developed into a highly influential intellectual centre in the Islamic world. Al-Ma'mun used the Baitul Hikmah as a place to translate scientific works from Greek, Roman, Persian, and Indian into Arabic, intending to introduce ancient knowledge that could enrich Islamic civilisation. This translation project enabled major scientific works such as Ptolemy's Almagest and the works of Aristotle to be translated, which provided the foundation for further scientific development in the Islamic world. In addition, Baitul Hikmah became a centre of scientific research where Muslim scientists such as Al-Khwarizmi, Al-Razi, and Al-Farabi developed their thoughts in a variety of fields, from mathematics and astronomy to medicine and philosophy. Al-Khwarizmi, for example, introduced the concept of algebra that became the basis for the development of mathematics in the Western and Islamic worlds. Al-Razi developed medicine and introduced scientific methods in medicine, while Al-Farabi became an important figure in developing philosophy and logic. With the Baitul Hikmah, Baghdad became a world intellectual centre that was influential not only in the Islamic world but also in the Western world through the translation of scientific works that were translated into Latin later on (Afandi & Khobir, 2025).

Unlike Al-Azhar in Cairo, which was founded by the Fatimid Dynasty in 970 AD, the establishment of Al-Azhar was the culmination of the Fatimid Dynasty's political and religious ambitions, which began with their massive expansion from North Africa to the heart of the Islamic world. After successfully consolidating power in Ifriqiya (Tunisia), Caliph Al-Mu'izz li-Din Allah viewed Egypt as a strategic region for overthrowing the Abbasid Caliphate's dominance in Baghdad. In 969 AD, their trusted commander, Jawhar al-Siqilli, successfully conquered Egypt and immediately laid the first stone for the construction of a new city named Al-Qahirah or Cairo. As the heart of the new capital, Jawhar instructed the construction of a grand mosque that was projected not only as a place of worship but also as a symbol of the supremacy of the Fatimid Dynasty (Halm, 2021).

Al-Azhar is one of the most important and influential centers of Islamic education in the history of the Islamic world (Saputra, 2021). Ultimately, Al-Azhar's transformation from a mosque into a formal, organized center of education took place under the leadership of Vizier Ya'qub ibn Killis in 975 AD. He began providing stipends for teachers and students, effectively transforming

the mosque into an institution of higher learning. Al-Azhar also developed into a university that produced missionaries or da'i whose task was to spread Ismaili theology throughout the world. Over time, this institution not only taught religious knowledge but also became a center for the study of philosophy and literature, making it one of the oldest intellectual centers to survive through various dynastic changes in Egypt (Hitti, 2024).

As it developed, Al-Azhar not only focused on religious education but also began to teach secular sciences. Under the rule of Caliph al-Mu'izz li-Din Allah and vizier Ya'qub ibn Killis, Al-Azhar began to develop a formal education system. In 988, 45 scholars were invited to teach at Al-Azhar, marking the beginning of formal education at the institution. Although Al-Azhar remained the centre of religious teaching, particularly Islamic law, tafsir, and hadith, other sciences such as astronomy, mathematics, logic, and philosophy were also introduced. This approach of combining religious and secular sciences shows how the Fatimids sought to integrate secular and religious knowledge, which was uncommon in many other Islamic educational institutions of the time. Al-Azhar developed into a highly influential centre of science (Abdullah & Jinan, 2024). However, during the reign of Caliph al-Hakim bi-Amr Allah, Al-Azhar faced a major challenge. Al-Hakim, known for his authoritarian policies, introduced a number of policies that were not always favourable to the scholars and teachers at Al-Azhar (Valter, 2019). Nonetheless, al-Hakim also established Dār al-ʿIlm at Al-Azhar, which served as a centre for intellectual studies that was more open to various disciplines. Despite the political tensions and uncertainties, Al-Azhar remained the centre of science in the Islamic world

However, after the fall of the Fatimid dynasty in 1171, Al-Azhar underwent major changes. Saladin, who conquered Egypt and ended Fatimid rule, took over Al-Azhar and turned it into a Sunni educational centre, abolishing the Ismaili Shia teachings previously taught there. Although these changes affected the teaching at Al-Azhar, the institution continued to function as a very important centre of religious education in the Islamic world. Over time, Al-Azhar continued to adapt to the changing times and became a symbol of the integration of religious and secular sciences in the Islamic educational tradition. In 1961, Al-Azhar was officially transformed into a university under the Egyptian government, and since then, it has become one of the largest and most influential Islamic universities in the world. Today, Al-Azhar offers a wide range of study programs, not only in religion but also in medicine, engineering, and social sciences, which shows how Al-Azhar continues to evolve and adapt to the challenges of the times (Azmiyah, Yafi, Zulmuqim, & Masyhudi, 2024).

Thus, despite political challenges and major changes after the Fatimids, Al-Azhar has endured as a significant educational institution, combining religious and secular knowledge, which makes it one of the oldest and most influential educational establishments in the Islamic world.

Although both Al-Azhar and Baitul Hikmah served as centres of education and research, there were notable differences in their approach to science. Baitul Hikmah concentrated on translating and developing natural sciences, mathematics, and Greek philosophy, while Al-Azhar prioritised religious studies and Ismaili theology. In other words, while these two institutions acted as intellectual centres, they exhibited different orientations in advancing science.

Differences in Support for Science

The Abbasid dynasty, which ruled from 750 to 1258 CE, was known for its commitment to the development of science and intellectualism. One of their greatest efforts was to focus on the translation of ancient Greek and Roman scholarly works. During the Abbasid reign, translation activities became one of the top priorities, aiming to access and preserve knowledge from ancient civilisations for application in the context of the Islamic world. This was very important in the development of science and technology at that time, and played a major role in shaping the intellectual tradition of the Islamic world. The translation of ancient Greek and Roman works began with the establishment of the Bayt al-Hikmah (House of Wisdom) in Baghdad in the 9th century, which served as a centre for study and translation. The establishment of Bayt al-Hikmah by Caliph al-Ma'mun (r. 813-833 CE) was a strategic step in ensuring that scholarly works from

various disciplines, such as philosophy, astronomy, mathematics, medicine and geography, were translated into Arabic. Under al-Ma'mun's leadership, Bayt al-Hikmah not only focused on translation, but also became a centre of scientific research where Muslim scientists developed new ideas based on these works (Zaitun, 2024).

One of the major achievements of this initiative was the translation of the works of Aristotle, Galen, and Ptolemy, which were very influential in the development of science in the Islamic world. The translation of Aristotle's works, for example, influenced many fields of science, especially in logic and philosophy. Galen, an ancient Roman physician, had his medical works, such as On the Pulse, translated and used as the basis for the development of medical science in the Islamic world. Likewise, Ptolemy's works in astronomy provided the basis for the development of theories on planetary movements (Anzalman et al., 2024).

Caliph al-Ma'mun was very supportive of this translation project as he realised the importance of ancient knowledge for the advancement of Islamic civilisation. In fact, he gave large rewards to translators and scholars who succeeded in transferring such knowledge. Scientists and philosophers, such as Al-Kindi, Al-Farabi, and Ibn Sina (Avicenna), took inspiration from the translated works and developed new theories covering a wide range of disciplines, from mathematics, astronomy, and medicine to philosophy (Ibrahim, 2021).

These translations not only brought knowledge from the ancient Greek and Roman world, but also served as a bridge between the Western world and the Islamic world. The knowledge translated and developed by Muslim scientists was then spread to Europe, especially through Spain, and played an important role in the rise of the European Renaissance. Muslim scientists refined and developed this ancient knowledge, which then became the basis for many scientific discoveries in the following period (Diana, Daulay, & Sumanti, 2025).

Thus, the Abbasid dynasty played an important role in preserving and developing the knowledge of the ancient Greek and Roman civilisations through translation and research. The translation activities supported by the Abbasid caliphs, especially al-Ma'mun, not only enriched the Islamic world with knowledge but also had a major impact on intellectual development in the West.

Subsequently, the Fatimid dynasty, which ruled from the 10th to the 12th century, placed education as an important element in spreading their teachings, especially in the fields of Ismaili studies and religious philosophy. As rulers who adhered to the Ismaili school of Islam, the Fatimids sought to establish educational institutions that not only taught the general teachings of Islam but also emphasised Ismaili teachings and the application of philosophy as a means of understanding divine revelation and reality (Azmiyah et al., 2024).

During the reign of Caliph al-Mu'izz li-Din Allah, the Fatimids established Al-Azhar in Cairo in 970 CE. Although Al-Azhar was primarily recognised as the main mosque and religious centre, it was also transformed into a hub of higher education that taught Ismaili teachings in depth. The instruction here was not limited to the sciences of fiqh and tafsir; it also encompassed the philosophy of religion, which formed the foundation of Ismaili teachings. Ismaili teachings, known for their esoteric nature and emphasis on profound interpretations of religious texts, heavily focus on uncovering the hidden meanings that are often invisible to the average Muslim.

Philosophy of religion, in this context, serves to bridge the understanding between reason and revelation. The Fatimids integrated Greek and Roman philosophy, which was mainly influenced by the Aristotelian philosophical tradition, with their religious teachings. Fatimid scientists and philosophers, such as Al-Kindi and Al-Farabi, sought to harmonise reason with revelation. They viewed philosophy as a tool to understand God and the universe, and to reveal divine truths found in the Qur'an and hadith (Zain, 2017). In addition, Fatimid scholars taught philosophy of religion as part of a broader understanding of man's relationship with God. They emphasised that ratio and logical thinking do not contradict divine revelation, but, on the contrary, they support each other. In the Ismaili tradition, philosophy is used to deepen spiritual understanding and to explain more abstract concepts in Islamic teachings. This is seen in the teaching provided by the Dār al-ʿIlm (House of Knowledge), established by the Fatimids as an

educational and translation institution, where many works of Greek and Roman philosophers were translated into Arabic and used to enrich theological understanding (Nasr, 2006).

Fatimid education in the field of philosophy of religion also focused on the development of deep theological thought and the development of an esoteric understanding of Islamic teachings. Here, philosophy is not only meant to understand the physical world, but also to understand the higher spiritual dimension. This thinking is in accordance with the Ismaili view that only a handful of people can understand the hidden meaning of divine revelation, which can only be achieved through deeper knowledge and philosophical learning (Manggala et al., 2025).

Thus, the Fatimid dynasty made Ismaili education and religious philosophy the main pillars of their educational system. This teaching aimed not only to form religious scholars and leaders but also to cultivate intellectuals capable of understanding and developing religious teachings in a more philosophical and esoteric context. This education strengthened the Fatimid ideological legitimacy by exploring teachings that were considered part of the higher scientific and spiritual traditions in Islam.

The Influence of Politics on Science

Political stability during the Abbasid caliphate played a very important role in supporting scientific progress. In this period, which lasted from 750 to 1258 AD, the Abbasid caliphate became one of the pinnacles of Islamic civilisation, with Baghdad as the centre of culture and science. This success was due to relatively stable political conditions, which allowed for a favourable environment for the development of science. The guaranteed security under Abbasid rule and the development of adequate infrastructure, such as libraries, educational institutions, and hospitals, created a conducive space for scientists to work. One important example is the establishment of Bayt al-Hikmah (House of Wisdom) by Caliph Al-Ma'mun in the 9th century (Efendi et al., 2025). The institution not only served as a centre for the translation of scientific works from Greece, Persia, and India, but also as a gathering place for scientists, philosophers, and mathematicians from all over the world. With the Bayt al-Hikmah, many scientific works were translated into Arabic, which then provided the basis for further development in various disciplines, including mathematics, astronomy, medicine, and philosophy.

During the Abbasid period, the caliphs, especially Al-Ma'mun, gave great support to scientists and scientific research. This was reflected in the establishment of Bayt al-Hikmah, which symbolised the government's openness to knowledge from various traditions (Algeriani & Mohadi, 2019). This approach encouraged the advancement of science, as scientists not only learned from Greek texts but also developed and enriched that knowledge. For example, scientists like Al-Khwarizmi were instrumental in developing algebra, while Ibn Sina (Avicenna) wrote Al-Qanun fi al-Tibb (The Canon of Medicine), which became the main reference in the medical world for centuries (Rahman & Sudirman, 2024).

In addition, political stability that supported economic growth also had a positive impact on scientific progress. Thriving trade and cultural exchanges between the Islamic world and the West and East allowed scientists to gain access to knowledge from all over the world. Thus, science was not only confined to the Islamic region, but was also influenced by outside cultures and knowledge, which in turn enriched scientific understanding among the Islamic community (Lyons, 2010).

With the support of the Abbasid government and stable political conditions, scientific progress during this period reached its peak, resulting in major discoveries in astronomy, mathematics, medicine, and philosophy. This reflects how political stability can create a favourable environment for the development of science, which not only contributed to the advancement of the Islamic world but also had a great influence on Western civilisation in the Middle Ages.

Meanwhile, the Fatimid dynasty faced significant internal political challenges, which had a direct impact on the sustainability of their scientific centres, such as Dār al-ʿIlm (House of Knowledge) in Cairo. Although in its heyday, the dynasty was known as the patron of science, a

series of internal crises ranging from power struggles to sectarian divisions gradually weakened political stability and, in turn, affected their scientific institutions.

In the early 11th century, the reign of Caliph al-Hakim bi-Amr Allah (996-1021) experienced significant internal tensions. After the assassination of the vizier Barjawan in 1000, al-Hakim assumed full control, but his authoritarian policies and executions of high-ranking officials caused instability among the Fatimid elite. Nonetheless, al-Hakim continued to support scholarly activities by founding Dār al-ʿIlm in 1005, which became the leading centre of scholarly studies of its time. However, mounting political tensions and inconsistent policies caused uncertainty in the sustainability of these scientific institutions. Sectarian divisions also posed a major challenge to the Fatimid dynasty. After the death of al-Mustansir Billah in 1094, there was a dispute over the succession between his two sons, al-Musta'li and Nizar. This split not only split the Ismailiyah community into two main branches, but also led to internal conflicts that weakened the governmental structure and overall political stability (Brett, 2019). As a result, the previously thriving scientific centres experienced a decline in support and resources.

During the reign of al-Hafiz (1132-1149), the Fatimid dynasty faced further challenges. Al-Hafiz, who ascended the throne through a controversial process, faced opposition from some within the Ismailiyah community. Further schisms ensued, including the formation of a Tayyibi branch that challenged al-Hafiz's authority. This crisis of legitimacy diverted attention from scientific development and led to a decline in support for educational and research institutions (Daftary & Jiwa, 2017).

Overall, although the Fatimid dynasty initially contributed greatly to scientific progress, internal political challenges such as power struggles, sectarian divisions, and legitimacy crises gradually eroded their political stability. As a result, the once-thriving scientific centres experienced a significant decline, reflecting the close relationship between political stability and the sustainability of scientific institutions.

Famous Scientists and Thinkers

During Abbasid rule, Baghdad became an important intellectual centre, and scholars from various disciplines sought to develop and enrich existing knowledge, both by accessing the Greco-Roman heritage and by developing new concepts that had a major impact on the Islamic world and Europe. One of the most famous figures of the Abbasid era was Al-Khwarizmi, known as the "father of algebra." Al-Khwarizmi developed a system of algebra that is still in use today. His work entitled Al-Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala introduced algebraic methods for solving quadratic and linear equations, which became the foundation for modern mathematics. Not only algebra, but Al-Khwarizmi was also instrumental in the spread of the Hindu-Arabic numeral system, which replaced the Roman numeral system in the Western world (Eschenburg, 2020).

Besides Al-Khwarizmi, Ibn Sina, or Avicenna, in the Western world, was a highly influential figure in the fields of medicine and philosophy. His monumental work, Al-Qanun fi al-Tibb (The Canon of Medicine), became the main reference in medicine for centuries, both in the Islamic world and in Europe. Ibn Sina was not only known as an outstanding physician but also as a philosopher who combined Aristotelian thought with Islamic religious teachings. His thoughts on metaphysics and epistemology exerted a great influence on European thought during the Renaissance (Zargaran, Mehdizadeh, Zarshenas, & Mohagheghzadeh, 2012). Al-Razi, or Rhazes, was also one of the great scientists of the Abbasid period who contributed greatly to the field of medicine. He is known for his influential medical work, Kitab al-Hawi (The Comprehensive Book), which became the medical encyclopedia of its time. Al-Razi is also famous for his discovery in distinguishing between smallpox and measles, which was an important achievement in the medical field. In addition, Al-Razi wrote many works on alchemy, natural philosophy, and ethics.

In the field of philosophy, Al-Farabi was instrumental in combining Aristotelian and Neoplatonic thought with Islamic teachings. Al-Farabi, often referred to as the "Second Master" after Aristotle, wrote extensively on politics, logic, music, and social philosophy. His work, Al-

Madina al-Fadhila (The Virtuous City), discusses the ideal society and the relationship between philosophy and social life, making him one of the main figures in Islamic political thought (Guntoro, 2023; Imankul, Abdildin, & Аубакирова, 2023). Al-Battani, an astronomer from the 9th century, is known for his highly accurate measurements of planetary movements, which contributed to the astronomical understanding of the time. His famous work, Kitab al-Zij, became an important reference in Islamic and European astronomy. Al-Battani improved the calculation of the length of the solar year and developed a more precise method of determining the positions of celestial bodies, which provided the basis for the development of astronomical theory in Europe (Aizid, 2018).

Besides them, Al-Tusi, an astronomer and mathematician who lived during the late Abbasid dynasty, also made great contributions to the field of astronomy. He is known for his Tusi model, which was used to explain the movement of planets. Al-Tusi's works provided the basis for the development of astronomy in the Islamic world and Europe, especially in the context of more accurate observations and measurements (Kirchner & Amirshahi, 2023).

The contributions of these scientists and thinkers were not only limited to the development of science in the Islamic world, but also had a great impact on European thought in the Middle Ages. Many of their works were translated into Latin, which helped spread this knowledge throughout Europe. Through translation and further development by European scientists, the ideas introduced by Abbasid scientists became the basis for many scientific discoveries during the Renaissance and beyond.

Thus, the Abbasid dynasty played a very important role in the development of science in the Islamic world, as well as in its influence on scientific and philosophical thought in Europe. Abbasid scientists not only retained and developed knowledge from Greek and Roman civilisations, but also created profound new theories that have survived into modern times.

Meanwhile, scientists and thinkers of the Fatimid period, although mostly focused on religious and philosophical studies, also had a major influence in the field of science, especially in relation to Ismaili teachings and the application of philosophy in theology. One of the main figures who was highly influential in Fatimid intellectual thought was Al-Shahrastani. Although he lived a little after the peak Fatimid era, his works still reflect the influence of Fatimid thought, particularly in the philosophy of religion. Al-Shahrastani is known for his work entitled Al-Milal wa al-Nihal (The Book of Sects and Creeds), which categorises the various sects in Islam and other religions. He wrote extensively on theology, philosophy, and the history of religions, with a profound rational approach. Al-Shahrastani is also known for his esoteric views, aligned with Ismaili teachings, which focus on the hidden understanding of religious texts (Sabjan, 2022).

Al-Mu'ayyad al-Shirazi was another highly influential figure, both as a scholar and as a thinker. He was an important scholar in the Ismaili tradition and an intellectual leader who supported Fatimid teachings. Al-Mu'ayyad wrote a number of works dealing with philosophy, logic, and theology, and was instrumental in introducing Ismaili teachings in a more systematic and structured form. One of his most famous works is Al-Mahasin al-Mutawwal, which explains the basic principles of Ismaili teachings and introduces new ways of understanding revelation and truth. Al-Mu'ayyad's thought was very influential on the development of theology and philosophy in the Islamic world, especially in the Ismaili tradition (Qutbuddin, n.d.) .

During the Fatimid period, education was also very supportive of the development of intellectualism. Al-Azhar, founded by the Fatimids in 970 CE, became not only an important mosque but also an educational centre for the study of Ismaili teachings. Although Al-Azhar was initially known more as a place to study religion, over time it developed into a centre for the study of philosophy and science. The teaching of Ismaili religious philosophy is strongly linked to the application of rational and logical thinking in interpreting revelation, which characterises Fatimid thought (Abdullah & Jinan, 2024). Thus, the scientists and thinkers of the Fatimid period, both in religion and science, made important contributions that involved the integration of religious

teachings and philosophy. These scholars sought to bridge revelation with rational thought, creating an intellectual tradition that deeply integrated science, philosophy, and religion.

CONCLUSION

This research shows that there were significant differences in scientific focus and acceptance of scientific culture between the Abbasid and Fatimid dynasties. The Abbasid dynasty, with its intellectual centre in Baghdad through the Baitul Hikmah, focused more on the development of natural sciences, the translation of scientific works from Greece, Rome, and India, and the dissemination of mathematics, astronomy, medicine, and philosophy. The existence of the Baitul Hikmah as an institution that integrated various scientific traditions demonstrates the Abbasid attempt to create an inclusive platform for the development of science involving diverse disciplines and cultures. On the other hand, the Fatimid dynasty, with its intellectual centre in Cairo through Al-Azhar, focused more on teaching religious sciences, particularly those related to Ismaili Shia teachings in its early days. Over time, Al-Azhar evolved into a more inclusive educational institution, teaching a variety of disciplines such as philosophy, law, and astronomy, albeit with a stronger emphasis on religious studies and theology. This difference reflected the Fatimids' more dominant theological orientation, while the Abbasids encouraged the development of natural sciences and philosophy of a more universal nature. These differences show that although both dynasties had a great influence on the development of the scientific culture of the Islamic world, they had different approaches to supporting and developing science, which were influenced by political factors, theology, and the policies of their respective caliphates. The Abbasids were more oriented towards translation and the development of natural sciences, while the Fatimids emphasised religious understanding and philosophy.

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