6. The Impact of Islamic Civilization on Scientific Advancement: An Analytical Study

أثر الحضارة الإسلامية على التطور العلمي: دراسة تحليلية

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Abstract:

Islamic civilization (8th to 15th centuries CE) played a pivotal role in preserving, synthesizing, and developing scientific knowledge. This paper examines the major contributions of Muslim scholars to mathematics, astronomy, medicine, veterinary medicine, optics, geography, agricultural sciences, and other fields; the institutional and philosophical foundations that supported these developments; and the mechanisms through which this scientific knowledge was transmitted to Europe and contributed to shaping the modern scientific process. Drawing on recent literature, this paper argues that Islamic civilization was not merely a transmitter but also an innovator and facilitator of scientific method and thought, laying the foundations for all modern science. The paper also examines how modern scholarship can best integrate these contributions into the broader history of science.

Keywords: Islamic civilization, scientific development, knowledge transfer, medieval science, innovation, Golden Age of Islam

الملخص:

لعبت الحضارة الإسلامية (من القرن الثامن إلى القرن الخامس عشر الميلادي) دورًا محوريًا في الحفاظ على المعرفة العلمية وتوليفها وتطويرها. تتناول هذه المراجعة أهم مساهمات العلماء المسلمين في الرياضيات والفلك والطب، والطب البيطري والبصريات والجغرافيا والعلوم الزراعية وغيرها من المجالات؛ والأسس المؤسسية والفلسفية التي دعمت هذه التطورات؛ والآليات التي نُقلت من خلالها هذه المعرفة العلمية إلى أوروبا وساهمت في تشكيل العملية العلمية الحديثة. بالاستناد إلى الأدبيات الحديثة، تُناقش هذه الورقة أن الحضارة الإسلامية لم تكن مجرد ناقلة، بل كانت أيضًا مُبتكرة ومُيسِّرة للمنهج والفكر العلميين، مُرسية أسس جميع العلوم الحديثة. كما تبحث الدراسات في كيفية دمج الدراسات الحديثة لهذه المساهمات على النحو الأمثل في تاريخ العلوم.

الكلمات المفتاحية: الحضارة الإسلامية، التطور العلمي، نقل المعرفة، العلوم في العصور الوسطى، الابتكار، العصر الذهبي للإسلام

Introduction

Civilization is a broad social and cultural concept characterized by the advanced development of arts, knowledge, and collective progress across diverse races and religions. Its origins trace back to the earliest human settlements, with every nation contributing uniquely to its evolution. The distinguishing features of each civilization lie in the strength of its foundations and its lasting influence on humanity.

Islamic civilization, recognized as the only monotheistic civilization, is grounded in the belief in the oneness of Allah and rejects all forms of racial or ethnic discrimination. It was built through the contributions of various peoples: Arabs, Persians, Turks, Africans, Indians, Chinese, Malays, and others who embraced Islam and enriched its cultural and scientific legacy. Importantly, Islam encouraged the assimilation of knowledge from earlier civilizations, provided it aligned with Islamic principles.

During the period when Western civilization was undergoing the Dark Ages (approximately 700–1200 AD), the Islamic Empire stretched from Central Asia to Southern Europe. Science and learning flourished, with Arabic scholars valuing knowledge and making remarkable advances in fields such as science and mathematics. Many Greek and Roman texts were translated into Arabic, forming the basis for further intellectual development.

In modern times, however, there is a tendency either to glorify the achievements of the Islamic past without examining the underlying causes of its success or to overlook the reasons behind its later decline. Despite its influence, Islamic contributions to science are often underrepresented in modern discourse. This study seeks to explore and emphasize the enduring contributions of Islamic civilization to the advancement of science throughout history. This ~~includes:~~ includes exploring the scientific achievements of Islamic civilization, analyzing the transmission of knowledge from Islamic scholars to Europe, and evaluating the long-term impact on modern science.

The Emergence of Islamic CIvilization

Many historians trace the origins of Islamic civilization to the 7th century CE, coinciding with the birth of the Prophet Muhammad (peace be upon him) in 571 CE. His prophetic mission began in 610 CE, and after establishing a profound religious and social transformation across the Arabian Peninsula, he passed away in 632 CE. Following the Prophet's demise, Islamic civilization continued to advance under his successors and reached remarkable heights during the Umayyad and Abbasid dynasties. These periods witnessed significant achievements in religion, culture, art, and science, solidifying the influence of Islamic civilization over much of the known world. Undoubtedly, this era stands as one of the most exceptional and distinguished periods in human history (Ashimi, 2016).

The Islamic Empire, which stretched from the Mediterranean to India and Malaysia and from the Caspian Sea to North Africa, encompassed many cities that had once been the cultural and intellectual centers of Greece, Rome, Persia, and India. As a result, Islam played a crucial role in preserving and advancing the scientific knowledge inherited from these earlier civilizations (Group, 2006, p. 231). Guided by the Qur'an and the teachings of the Prophet Muhammad (peace be upon him), the faith's emphasis on learning and the pursuit of knowledge inspired

religious scholars and leaders to protect, cultivate, and spread scholarly works throughout the Islamic world (Haqparast & Salangi, 2024).

Islamic civilization is closely associated with the Islamic world, which can be geographically divided into three main regions. When viewed as a whole, the Islamic world resembles an eagle in flight with its wings fully spread. The central region represents the core or body of this "eagle," consisting of the Arabian Peninsula, Iraq, Palestine, Syria, and Asia Minor—where Asia Minor forms the head and beak, while the southern Arabian Peninsula represents the tail. The right wing extends eastward, encompassing Iran, Turkey, Afghanistan, the Indian subcontinent, and reaching as far as Malaysia and Indonesia. The left wing stretches westward, covering North Africa and historically extending into parts of Spain and France. This vivid geographical analogy illustrates the vast expanse and interconnectedness of Islamic civilization across continents (Ashimi, 2016).

Concept of Science in Islamic Thought

According to Jusoh (2014), Islamic science encompasses the pursuit of knowledge that engages both intellect and sensory experience to interpret data and facts derived from scientific investigation. It also evolves in alignment with advancements in science and technology (Jusoh, 2014). According to the Qur'anic context, scholars in Islam do not only refer those who belong to the sciences of Sharia and related instruments, but rather greater than that. The divine scholars are those who combine knowledge and action, and whose objectives are to be liberated for God, Lord of the Worlds, whether their efforts are connected to religious or worldly sciences. Every scholar who strives to exert effort and acquire knowledge, making it beneficial and connecting it to righteous action, proposes knowledge that serves the guidance of humanity.

Islamic Knowledge and Strengthening the Nation's Constants: Introduction and Principles (Amer & Amer, 2025). Therefore, knowledge is everything that a person learns that benefits humanity in their lives and in their relationships with their Lord and with each other. Islam has called people to learn and has strongly urged it, guiding them to the sources of knowledge represented by the written Book (the Word of God), the Prophetic Sunnah, and the visible universe with the verses and wisdom that God has deposited therein. God Almighty says in the first verse revealed: "Read in the name of your Lord who created" (Al-Alaq 96:1). He urged people to reflect on the universe and creation, first and foremost among them humanity, saying: "And in yourselves - then will you not see?" (Adh-Dhariyat 51:21). He also urged people to contemplate and research the sciences of life, agriculture, botany, geography, geology, sociology, and zoology: "Have you not seen that God sends down water from the sky and produces thereby fruits of varying colors? And among the mountains are streaks white and red of varying colors and [others] very black. And among people and animals, and livestock are varying colors likewise. Only those of His servants fear God who have knowledge. Indeed, God is Exalted in Might and Forgiving." (Fatir 35:27-28). The scholars' opinion includes everyone who specializes in the sciences of the written Book and everyone who specializes in the visible universe. They said that the jurists are doctors and the hadith scholars are pharmacists. Imam Ahmad ibn Hanbal said: "The jurists were doctors and the hadith scholars were pharmacists: then Al-Shafi'i came as a physician-pharmacist. The world has never seen anyone like him" (Amer & Amer, 2025).

The History of Science in Islam

The early advancement of science in Islamic civilization remains partly unclear due to limited original sources. However, by the mid-2nd century of Islam (around 777 CE), scientific activity was already well established, with significant contributions in fields like cosmology, geography, astronomy, and alchemy. The death of Jabir bin Hayyan marks this formative stage. Despite scarce early evidence, medicine and astronomy can be traced back to the time of Prophet Muhammad (Pbuh). His teachings on health, hygiene, and disease formed the basis of *al-Tibb al-Nabawi* (Prophetic Medicine), which later advanced into a distinct medical discipline. Similarly, pre-Islamic Arabic astronomy was transformed under the influence of Qur'anic cosmological concepts (IQBAL, 2007). The first century of Islam despite significant political developments was characterized not only by military expansion that introduced Muslims to diverse cultures and civilizations but also by remarkable intellectual energy and a deep curiosity about the world. The groundwork for the Islamic scientific tradition was already laid before Greek texts were translated and integrated into Islamic scholarship in the 9th century (Saliba, 2007). Scientific progress in the Islamic world began early, supported by visionary rulers like the Umayyad caliph Abd al-Malik bin Marwan (AD 646–705), who valued scientific advancement for its benefits to governance. Even today, political support remains an essential factor for the flourishing of science (Zou'bi, 2025).

The intellectual openness of Islamic thought was a key driving force behind the advancement of Islamic civilization and its global impact. Knowledgeable and visionary caliphs played a crucial role in fostering this progress. Simulteneously, scholars and thinkers across the Islamic world continuously pursued the expansion of knowledge in both the humanities and the sciences. This pursuit led to the emergence of diverse branches of religious scholarship—such as Qur'anic recitation, calligraphy, and jurisprudence, as well as remarkable advancement in rational and empirical disciplines, including philosophy, linguistics, history, natural sciences, and mathematics, particularly algebra (Mugiyono, 2013).

The Intellectual Legacy of Islam: Foundations of Knowledge and the Emergence of the European Renaissance

Islam, which began with the divine command *"Iqra"* (Read), places great importance on education and the pursuit of knowledge, making it an obligation for every Muslim throughout their lives. Consequently, the development of science and learning became a central aspect of Muslim society. In contrast to the intellectual stagnation that characterized Europe during the Middle Ages, where religious dogma often restricted inquiry, Islamic civilization flourished as a beacon of enlightenment. Muslim scholars made remarkable advances across numerous disciplines, including the natural sciences, mathematics, astronomy, philosophy, history, literature, and geology. Their achievements were so extensive that Europeans still constrained by Church authority—sometimes viewed Muslims with suspicion, accusing them of focusing too heavily on worldly knowledge. Nevertheless, the scientific and intellectual legacy of Muslim scholars played a pivotal role in inspiring the European Renaissance. At a time when reason and inquiry were suppressed in Europe, Muslim scientists not only translated Greek works into Arabic but also preserved, refined, and expanded upon them. Following the Crusades, this body of knowledge reached Europe through cultural exchanges in regions such as Spain, Sicily, and Italy, where merchants, soldiers, and translators facilitated its transmission ultimately laying the

foundation for Europe's intellectual revival and the dawn of the Renaissance (Haqparast & Salangi, 2024). Table 1 provides details of major translations completed during this second phase (eleventh to the fourteenth centuries). These three centuries saw significant expansion of the links between the Muslim world and the emerging Europe, which was recovering from the ruins of the Roman Empire through a complex process of intermingling populations, Viking settlements, and unprecedented economic growth (IQBAL, 2007).

Table 1 Some Arabic scientific and philosophical works translated into Latin between the eleventh and the thirteenth centuries

Author	Arabic Work	Latin/English Title	Translator
al-Khwarizmi	*Astronomical tables*	*Ezich Elkaureismi per Athelardum bathoniensem ex arabico sumptus*	Adelard of Bath (*fl.* 1116–1142)
Abu Ma'shar	*Kitab al-madkhal al-Saghir* (Shorter Introduction to Astronomy)	*Ysagoga minor Iapharis matematici in astronomiam per Adhelardum bathoniensem ex Arabic sumpta*	Adelard of Bath
Ibn Sina	*Risala (maqala) fi-l-nafs*	*De anima*	Gundisalvo with Ibn Dawud
al-Ghazali	*Maqasid al-falasifa*	*The Aims of the Philosophers*	Gundisalvo with Johannes
al-Farghani	*'Ilm al-nujum*	*De Scientia astorum*	John of Seville (*fl.* 1133–1142)
Abu Ma'shar	*Kitab al-Madkhal al-kabir ila 'ilm ahkam al-nujum*	*Great Introduction to the Science of Astrology*	John of Seville
Qusta bin Luqa	*Kitab al-Fasl bayn al-ruh wa-l-nafs*	*De differentia spiritus et anime*	John of Seville
al-Khwarizmi	*Algebra*	*Algebra*	Robert of Chester (*fl.* 1140–1150)
al-Kindi	*al-Kitab al-astarlab*	*De iudiciis astrorum*	Robert of Chester
al-Battani	*Zij al-sabi*	*De motu stellarum*	Plato of Tivoli
Ibn Sina	*Al Qanun fi'l-tibb*	*Canon of Medicine*	Gerard of Cremona (*ca.* 1114–1187)

The Contributions of Islamic Civilization to Global Scientific Advancement

Muslim scholars were inspired by the Quranic injunctions to seek knowledge and study the natural world as signs of the Creator. By Combining, this spiritual motivation with the rich legacy of ancient Greek, Indian, and Persian learning, Islamic civilization became the scientific centre of the world for over 500 years. During this era, Arabic became synonymous with learning and science. This period also laid the groundwork for modern universities, algebra, and empirical inquiry (Ashrof, 2024).

Islamic civilization, particularly, between the 8th and 14th centuries, made landmark contributions to global science across various fields including mathematics, optics, astronomy, medicine, and pharmacy, while also introducing institutional and methodological innovations. Below are key figures and developments supported by evidence from primary and secondary sources. The early Middle Ages were characterized by widespread misconceptions and the dominance of Christian rulers, which led to a decline in scientific progress and intellectual pursuits across the Western world. During this time, Muslim scholars such as Ibn Sina and Ibn Rushd played a vital role in preserving and advancing Greek philosophy by translating key works into Arabic, analyzing them critically, and integrating their insights into Islamic thought. The scientific knowledge refined by these scholars later returned to Europe through the translation movement (Kashani, 2008). Under the Abbasid caliphs—particularly Harun al-Rashid and his son al-Ma'mun—Baghdad became a major center of intellectual activity. These rulers actively promoted the collection and translation of scientific manuscripts from different regions, leading to the establishment of major translation efforts. This movement not only preserved ancient knowledge but also laid the foundation for the golden age of Islamic civilization (O'Leary, 1342).

Mathematics

It is widely recognized that medieval Islamic civilization played a central role in advancing the technical foundations of mathematics. Building upon the intellectual heritage of Greek, Indian, and Persian scholars, Muslim mathematicians introduced significant innovations across various mathematical fields and produced numerous treatises that presented new concepts and proved complex theorems. Although no single work from the medieval Islamic period focuses exclusively on the philosophy of mathematics, many Muslim scholars explored philosophical questions related to mathematics within broader discussions of mathematics, physics, metaphysics, and theology (*kalām*). When these scattered reflections are examined collectively, it becomes evident that while philosophy of mathematics was not an independent discipline in the Islamic intellectual tradition, Muslim thinkers developed deep and original insights into several philosophical aspects of mathematical thought (Zarepour, 2022).

Al-Khwarizmi and the Development of Algebra: The Origin of Alghorismic Thought

Anjum, 2018 and Nabirani, Evans, and Persaud (2019) review the development of algebra by al-Khwarizmi (al-Khwarizmi), a Muslim mathematician of the 8th and 9th centuries CE who played a pivotal role in the development of algebra. Born in Khwarazm (modern-day Uzbekistan), al-Khwarizmi studied various sciences in several languages and worked at the House of Wisdom in Baghdad under Caliph al-Ma'mun during the Islamic Golden Age. His most influential works include the Book of Addition and Subtraction According to the Hindu

Calculation, which introduced the decimal system and zero, and the Compendium on Calculation of Completion and Balancing, considered the first algebraic treatise and the origin of the term "algebra." His systematic, step-by-step approach to problem-solving led to the modern concept of the algorithm. In addition to mathematics, al-Khwarizmi contributed to astronomy, geography, and cartography, producing detailed world maps, astronomical tables, and studies on calendars and the astrolabe (Anjum, 2018; Nabirahni, Evans, & Persaud, 2019).

Medicine and Pharmacology

Muslim scholars made monumental contributions to medical science by building upon the legacies of Greek, Persian, and Egyptian medicine. Physicians in the Islamic world were highly respected, and medical study was closely linked with philosophy, leading to major advancements in pharmacology, clinical observation, and optics. Hospitals were established across the empire, providing free medical care. Pioneers like al-Razi (865–925 CE) authored the *Al-Hawi*, a comprehensive medical encyclopedia later translated into Latin, while Ibn Sina (Avicenna, 980–1037 CE) produced *The Canon of Medicine*, which became Europe's primary medical textbook for centuries. Islamic hospitals, known as **bimaristans**, functioned as centers for both treatment and education, often featuring specialized wards, pharmacies, and libraries, and offering free or low-cost care to the public. These contributions not only shaped medieval European medicine but also laid the foundation for modern medical science (Lindberg, 2007; Nasr, 2001; Pormann & Savage-Smith, 2007).

Ahmad, Rabee, and Zulkifle (2017) challenge the view that medieval Arab medicine was merely derivative, showing instead that Arab scholars contributed many original medical innovations—such as bedside clinics, mobile clinics, differential diagnosis (e.g. distinguishing measles from smallpox), specialized pediatrics, emergency care, and developments in ophthalmology, psychiatry, cardiology, etc. They emphasize that Arab medical research combined rational thinking, experimentation, and literary knowledge, citing Al-Razi's insistence that a physician must not rely solely on experiment without hypothesis and scholarship. The review thus argues that Arab-Muslim contributions significantly shaped medical knowledge and practice, and that many of their contributions were sources for later developments in Europe.

Both Obaidullah and Hehmeyer & Khan highlight that medieval Muslim scholars revolutionized medical science by advancing diagnostic techniques, surgery, pharmacology, and hospital organization, moving far beyond mere preservation of Greek medicine. They emphasize that figures like al-Razi, Ibn Sina, al-Zahrawi, and Ibn al-Nafis combined empirical observation, experimentation, and ethical medical practice grounded in Islamic values. Their works, including Al-Hawi, The Canon of Medicine, and treatises on surgery and circulation, became standard references in Europe for centuries, underscoring Islam's pivotal role in shaping global medical knowledge and practice (Hehmeyer & Khan, 2007; Obaidullah, 2007).

Veterinary medicine

During the Islamic Golden Age, Muslim scholars transformed veterinary medicine into a formal science, integrating it with medicine and natural philosophy. They produced detailed treatises on animal diseases, treatments, and ethics, emphasizing humane care guided by Islamic principles. The Arabic-Persian scholarly tradition helped preserve and spread this knowledge, shaping veterinary practice across regions for centuries (Richter-Bernburg & Said, 1996). Hare's article

shows that *Kitāb al-Falāhah* (a medieval agrarian manual) contains substantial veterinary content, including chapters on caring for livestock, diagnosing animal diseases, and advice on feeding and maintaining working animals. He also explores how ***Fleta*** (a legal text) complements this by giving rules related to animal welfare, ownership, and veterinary care obligations. The author argues these texts reflect a sophisticated awareness of animal health in medieval Islamic society integrating veterinary practice into agriculture, economics, and law (Hare, 1935).

Chemistry and Biology Sciences

In his 2001 study "Muslim Contribution to Chemistry," Salah Zaimeche highlights how Muslim scholars transformed chemistry from a speculative art into an experimental science. Pioneers such as Jabir ibn Hayyan, Al-Razi, Al-Zahrawi, and Ibn al-Wafid introduced systematic experimentation and laboratory methods, including distillation, crystallization, and sublimation, while discovering key substances like alcohol, nitric acid, sulphuric acid, and silver nitrate. Their works not only advanced industrial chemistry—such as in metallurgy, perfumes, and dyes—but were also translated into Latin, profoundly shaping European scientific progress. Zaimeche argues that Islamic chemistry was far from mystical alchemy; it was a disciplined, evidence-based pursuit grounded in empirical observation, making it one of the earliest true scientific traditions in history (Zaimeche, 2001). In the area of chemistry, Muslim scholarship led to the discovery of such substances as potash, alcohol, nitrate of silver, nitric acid, sulphuric acid and mercury chloride. It also developed to a high degree of perfection the arts of textiles, ceramics and metallurgy. Some mathematics processes retain their Arabic names today, such as al-Jabr which is now referred to as (Algebra). Similarly, in chemistry, words like "alcohol" and "al kali" are derived from their Arabic names al-kahl and al-qaliy respectively (Adeleke, 2014). Dhu'l-Nun and al-Jahiz were two prominent Muslim chemists of their time. Dhu'l-Nun primarily focused on the transmutation of metals, whereas al-Jahiz is noted for producing ammonia from animal waste through dry distillation. Other influential Muslim chemists included Ibn Khaldun (d. 1406), Al-Farabi, Ibn Sina (Avicenna), and Abul-Qasim Muhammad al-'Iraqi, among others. These scholars applied their chemical expertise to a wide range of industrial processes, and their contributions significantly influenced the development of modern chemistry (Adeleke, 2014).

Physics and Optics

Islamic scholars made fundamental advances in physics and optics, emphasizing experimentation and empirical observation. Ibn al-Haytham (965–1040 CE), in his *Book of Optics*, refuted the Greek theory of vision by demonstrating that light reflects off objects and enters the eye. He systematically studied reflection, refraction, and the behavior of light through lenses and pinholes, effectively developing early experimental methods such as the camera obscura. His meticulous use of observation and controlled experimentation predated modern scientific methodology by centuries and influenced later European thinkers including Roger Bacon and Witelo. These principles also had practical applications in architecture, instrumentation, and the precise calculation of time for religious practices (Saliba, 1992).

Geography, Engineering, and Technology

Islamic civilization contributed significantly to geography, engineering, and technological innovation. Al-Idrisi (1100–1165 CE) produced detailed maps, including the *Tabula Rogeriana*, integrating knowledge from Europe, Africa, and Asia (Saliba, 2007). Engineers developed water clocks, irrigation systems, and mechanical devices that improved urban infrastructure and agricultural productivity. Advances in architecture and hydrology reflected the application of scientific principles in building design, water management, and sustainable urban planning.

Intellectual Foundations of Islamic Science: Insights from the Translation Movement

After the rise of the new Islamic order under the Umayyads, Muslim scholars began to focus on preserving and expanding the intellectual heritage of earlier civilizations. Centers of learning and existing bodies of knowledge were safeguarded, and systematic efforts were made to translate major works into Arabic. These translations were not limited to Greek and Syriac—the languages of Hellenistic and Eastern Christian scholarship—but also included Pahlavi, the scholarly language of pre-Islamic Persia, and Sanskrit from India. Among the most distinguished translators were Hunayn ibn Ishaq, a renowned Arab-Christian physician, and Ibn al-Muqaffaʿ, who pioneered an Arabic prose style well suited to expressing complex philosophical and scientific concepts. This translation movement, which began in the early 8th century and reached its height during the reign of Caliph al-Maʾmun (813–833 CE) with the founding of the Bayt al-Ḥikmah or *House of Wisdom* in Baghdad, represented one of the most remarkable intellectual enterprises in human history. Its primary aim was to engage critically with the scientific and philosophical heritage of antiquity—especially Greek, Persian, and Indian traditions—and to reinterpret these ideas through the lens of Islamic thought. Key texts by Aristotle, Plato, and members of the Pythagorean school, as well as major works in astronomy, mathematics, and medicine, were rendered into Arabic. Significant Sanskrit treatises on astronomy and medicine were also translated. Through these collective efforts, Arabic emerged as the dominant language of science and philosophy for several centuries, serving as a repository for the accumulated knowledge of the ancient world. Importantly, these translations were not undertaken out of political or economic ambition but were inspired by the Islamic emphasis on the pursuit of knowledge (ʿilm). As long as these disciplines upheld the principle of tawḥīd the unity of Allah they were regarded as harmonious with the spirit of Islam rather than contrary to it. This intellectual openness enabled Muslim scholars to integrate, refine, and expand upon the scientific legacy of earlier civilizations, laying the foundation for many later advancements in global science (Baloch, 2019; Mazhar-ul-Haq, 2001).

Conclusion

Islamic civilization made profound and enduring contributions to global scientific development, establishing itself as a central hub of knowledge during the medieval period. By preserving, translating, and expanding upon the intellectual heritage of Greek, Persian, Indian, and other ancient civilizations, Muslim scholars not only safeguarded prior knowledge but also introduced original innovations across diverse disciplines, including mathematics, medicine, chemistry, optics, astronomy, geography, and engineering. The intellectual openness encouraged by Islamic thought, coupled with the support of visionary rulers and institutions such as the House of Wisdom, fostered a culture of inquiry, experimentation, and critical analysis that laid the foundations for the scientific method.

Moreover, the transmission of this knowledge to Europe through translation movements and intercultural exchanges significantly influenced the European Renaissance, bridging the gap between ancient science and modern scientific thought. Figures such as Al-Khwarizmi, Ibn Sina, Al-Razi, Ibn al-Haytham, and others exemplify the integration of empirical observation, rational reasoning, and ethical responsibility in scientific practice. Islamic civilization thus functioned not only as a transmitter of knowledge but as an innovator that shaped both the intellectual and methodological frameworks of modern science.

In sum, the legacy of Islamic civilization demonstrates that scientific progress is deeply interconnected with cultural, philosophical, and institutional contexts, underscoring the importance of acknowledging and integrating these contributions into the broader history of global science.

References

Adeleke, R. S. (2014). An Examination on the Contributions of Islam to Sciences and Civilization. Research on Humanities and Social Sciences, ISSN (Paper), 2224-5766.

Ahmad, W., Rabee, K., & Zulkifle, M. (2017). Arab and Muslim contributions to Medicine and Research A Review. Bangladesh Journal of Medical Science, 16(3), 339-345.

Amer, A., & Amer, E. (2025). Islamic Knowledge and Strengthening the Nation's Constants: Introduction and Principles (1 ed.). Selangor, Malaysia: IIUM Press.

Anjum, S. (2018). Al-Khwārizmī's contribution to mathematics. . Insight Islamicus, 18, 95–102.

Ashimi, T. A. (2016). Islamic Civilization: Factors Behind Its Glory And Decline. International Journal of Business, Economics and Law, 9(5), 180-184.

Ashrof, M. (2024). Exploring the Historical Muslim Perspective on Science and Knowledge. Retrieved from https://countercurrents.org/2024/12/exploring-the-historical-muslim-perspective-on-science-and-knowledge/

Baloch, Q. B. (2019). The Islamic Civilization. The Dialogue, 37-59.

Haqparast, H., & Salangi, M. M. (2024). The Impact of Islamic Civilization on the European Intellectual Awakening: An Analytical Study. Sprin Journal of Arts, Humanities and Social Sciences Sprin, 03(01), 57-62. doi:https://doi.org/10.55559/sjahss.v3i1.223

Hare, T. (1935). Some contributions to Mediæval veterinary science in the Kitāb al-Falāhah and in Fleta. In: SAGE Publications.

Hehmeyer, I., & Khan, A. (2007). Islam's forgotten contributions to medical science. CMAJ: Canadian Medical Association Journal, 176(10), 1467-1468.

IQBAL, M. (2007). Science and Islam. Westport, USA: Greenwood Press.

Jusoh. (2014). Falsafah Sains dan teknologi menurut al-Quran. UTM.

Kashani, H. (2008). Infinity: The Turningpoint of Islam, Philosophy, and Mathematics. Al-Hadi International Publishing House.

Lindberg, D. C. (2007). The Beginnings of Western Science. Chicago, USA: University of Chicago Press.

Mazhar-ul-Haq. (2001). A Short History of Muslim Spain, . Lahore: Bookland.

Mugiyono. (2013). Perkembangan Pemikiran Dan Peradaban Islam Dalam Perspektif Sejarah. Jurnal Ilmu Agama, 14(1), 1–20. Retrieved from https://www.neliti.com/id/publications/98384/perkembangan-pemikiran-dan-peradaban-islam-dalamperspektif-sejarah

Nabirahni, D. M., Evans, B. R., & Persaud, A. (2019). Al-Khwarizmi (Algorithm) and the development of algebra. Mathematics Teaching Research Journal, 11(1-2), 13-17.

Nasr, S. H. (2001). Science and civilization in Islam: ABC International Group.

O'Leary, D. (1342). The Transfer of Greek Science to the Islamic World. (A. Aram, Trans.) Tehran. Iran: University of Tehran.

Obaidullah, M. (2007). Medical science and Islam: an analysis of the contributions of the medieval Muslim scholars. Erişim adresi: https://www. researchgate. net/publication/270215891.

Pormann, P. E., & Savage-Smith, E. (2007). Medieval islamic medicine. Washington, DC.

Richter-Bernburg, L., & Said, H. (1996). Medical and veterinary sciences. Differentiation, 750(1050), 307.

Saliba, G. (1992). The Optics of Ibn al-Haytham: Books I-III on Direct Vision. In: JSTOR.

Zaimeche, S. (2001). Muslim Contribution to Chemistry.

Zarepour, M. S. (2022). Arabic and Islamic Philosophy of Mathematics (E. N. Z. (ed.) Ed. (Summer 2022 Edition) ed.): The Stanford Encyclopedia of Philosophy

Zou'bi, M. R. (2025). The Arab Islamic Civilisation as a Global Force for Good: A Reworked Science-Focused Historical Narrative. Retrieved from https://muslimheritage.com/global-force-for-good/