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Interfaith Engagement Beyond the Divide

Approaches, Experiences, and Practices

Springer

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Chapter 7
Understanding Multicultural Dimensions in the History of Progressive Science in the Classical Period of Islam (610–1258 CE)

Muqowim and Zulkipli Lessy

Abstract The classical period of Islam is generally considered from the early foundations of the faith until the Mongolian conquest of Baghdad in 1258. This study aims to portray the multireligious-cultural dimensions of scientific development during the classical periods of Islam, with a specific focus on the eighth to thirteenth centuries. Science and technology greatly contributed to the advancement of Islamic civilization during these centuries marked by the establishment of networks among Muslims and contributions to other nations. An additional influencer was that Islam is a religion and an ideology that is concerned with the formation of an independent society because Muslims at those periods had their own government systems, laws, and institutions. The advancement of science and technology was driven by Muslim rulers, kings, or sultans who served as patrons to strengthen political and economic power. Additionally, in Islam, there is the concept of propagating Islam (*dakwa*) to preach Islamic teachings to those who already adhered to Islam or those who had not received Islamic teachings. Muslims in those periods learned from other civilizations and strengthened their collaboration with other nations regardless of their religious, political, and cultural backgrounds. This chapter argues that a multicultural spirit was not only present at those times but was implemented in the context of scientific progress. Given this historical context, therefore, every Muslim scientist must adhere to an openness and a solid ethos to learn from other cultures and faiths.

Keywords Multiculturalism · Scientific progress · Islamic civilization · Golden age of Islam

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Introduction

The classical period of Islam is generally considered from the early foundations of the faith until the Mongolian conquest of Baghdad in 1258 (von Grunebaum, 2017). This study aims to portray the multicultural dimensions of scientific development during the classical period of Islam, with a specific focus on the eighth to thirteenth centuries. The progress of science in Islamic contexts is inseparable from the scientific transmission of pre-Islamic civilizational knowledge into the Islamic world (Hodgson, 1974). In fact, Muslim scientists contributed significantly to the transmission and further development of that science. Many religious and cultural factors influenced the development of the Islamic scientific tradition in asynchronous and diachronic ways. The asynchronous method focuses on the study of science at certain points in time [history], while the diachronic method focuses on the chronology of the development of science over time. Science in the classical era of Islam advanced substantially through engagement and cooperation with scientists from other religions. This important lesson can be applied in the present context, especially in the development of science and technology in the Muslim world. This is particularly true in Indonesia which lags behind other nations in terms of scientific discovery and technological innovation.

This chapter argues that the willingness to learn from other civilizations was apparent from the strong enthusiasm of Muslim scientists, who established collaborations with other nations regardless of their religion, culture, faith, or other backgrounds. This involved cultivating a multicultural spirit that was not only discussed at the time but was implemented over time in the context of scientific development. This is an important point to note for the Islamic world today. The implication of this history is that every Muslim scientist should have an open mindset to study with anyone and engage in interfaith dialogue. This was exemplified by other civilizations, including in Europe, who were inspired by and learned from the Islamic civilization in Baghdad. They modeled their scientific ethos on Muslim scientists and applied it in the West. Political patrons today may be reminded of and encouraged by this open and science-friendly paradigm as they design and legislate policies and programs that advance scientific innovations.

This chapter is organized as follows: we set the scene by elaborating on the historical background context for this treatise. This is followed by a discussion of scientific developments during the Umayyad Dynasty, which in turn engendered increased interfaith and intercultural influences during the Abbasid Dynasty. Next, we discuss interfaith cooperation under Caliph al-Ma'mun and then we turn our attention to Arabic as the international language of academia. This is followed by a discussion and critical analysis of the development of science, especially in the modern period. We also refer to examples of integrative-interconnective higher education practices and collaborative programs involving seminars, conferences, publishing and research with overseas academic stakeholders. A brief conclusion recapitulates the chapter's main lessons and recommendations.

Historical Background

Prior to the rise of Islam, the first half of the sixth century was known as the era of darkness. However, this era can be considered only as politically dark because other branches of science developed during this era including literature, agriculture, astronomy, botany, mathematics, medicine, and technology (Hodgson, 1974). These discoveries spread throughout the Byzantine Empire, Syria, India, and China. Mathematics and technology were particularly advanced and had substantial international influence. For example, there was historical evidence of the development of mathematics in Egypt as early as the fourth century BCE (Imhausen, 2016). In China several mathematical figures emerged, namely Hsia-hou Yang, Chen-luan, Chang Ch'iu-Chien (Gillon, 1977). Meanwhile, the medical field developed in Byzantium by Alexander of Tralles (Bouras-Vallianatos, 2016). During the Sassanid Dynasty (224–637 CE) in Persia, alcohol began being used for medicinal purposes (Hamdi et al., 2022).

During the time of the Prophet Muhammad's mission of spreading Islam, both in Mecca (610–622) and in Medina (622–632), the development of Islam was still limited to strengthening faith for its adherents in these two places. The progress of science and technology in Islam, during the classical period, was influenced by strong networks of Muslim scientists with other civilizations, such as Greek, Indian, Chinese, and Persian traditions (Bsoul, 2018). This occurred when the vast territory of Islam politically developed from the East in India to the West in Andalusia, Spain. These regions were under the reign of the first four caliphs or *Khulafa al-Rashidun* (632–661) until the Umayyad dynasties (Su, 2021). Islam rapidly transformed itself with increasingly expanded territories that held vastly different cultural backgrounds and histories (Bonney, 2004). There has been much scholarly debate regarding the motivations for early Islamic expansion (Ibrahim, 2018). Certainly, Islam contains basic teachings which not only have to do with the correlation between humans and God or the vertical relationship and the eternal living after in this earthly world, but also with the formation of an independent society with its governmental systems, laws, and institutions (Al-Ahsan, 2017).

Scientific Development During the Umayyad Dynasty

During, the Umayyad Dynasty (661–750 CE), Muslim territories stretched from India to Andalusia, and Muslim scientists rose to international prominence (van der Krogt, 2011). Hitti (1987) argues that Islamic culture was largely formulated by conquered peoples, unmatched in its literary, scientific, and philosophical brilliance and influence. Mu'awiyah, the first caliph of the Umayyad caliphate, reigned between 661 and 680 (Hodgson, 1974). During this time, the Muslim General Uqbah ibn Nafi conquered most of North Africa. In 670, he founded the city of Qayrawan in Tunisia which later became one of the centers of Islamic culture (Nasution, 1985). The

expansion of Muslims into the West occurred during the era of Al-Walid, the sixth caliph (reigned 705–715). Military General Musa ibn Nusayr attacked and conquered Algeria and Morocco. After subduing the two regions Tariq ibn Ziyad became the Muslim representative whose government was established in Tangier (Hodgson, 1974). In 711, Tariq ibn Ziyad crossed the strait located between Morocco and the European continent and landed in a place that became known as Gibraltar (*Jabal Tariq*) (Donner, 1999). The Mediterranean islands of Majorca, Corsica, Sardinia, Crete, Rhodes, Cyprus, and parts of Sicily were also controlled by Muslims. Ultimately, areas were under Muslim control included Spain, North Africa, Syria, Palestine, the Arabian Peninsula, Iraq, parts of Asia Minor, Persia, Afghanistan, and areas now called Pakistan, Turkmenistan, Uzbekistan, and Kyrgyzstan. The vast areas of Islamic power allowed dialogues between civilizations, religions, and cultures (Lapidus, 2002).

Increased Interfaith and Intercultural Influences During the Abbasid Dynasty

After the Abbasid revolution (750 CE), the Abbasid Caliphate established the city of Baghdad as the center of culture, science, and innovation (Nasution, 1985). Al-Mahdi (reigned 775–785), the successor of Caliph al-Mansur and third caliph of the Abbasid Caliphate, boosted the economy of the dynasty. He enhanced the agricultural system by providing irrigation and waterways to double the production of wheat, rice, dates, and olives. Mining products such as silver, gold, copper, and iron also flourished (Bobrick, 2012). During his reign, the transit of trades between the East and West increased, and Basrah became an important port. This intercultural enviroment continued under Harun al-Rashid (785–809) who built hospitals, pharmacies, and facilities of medical education. At the time, it was estimated that Baghdad had 800 doctors. Public bathing places were also established to improve hygene. Harun al-Rashid rose to such world prominence comprable to Charlemagne in Europe. Hence, the Abbasid Dynasty in Baghdad is known by historians as the golden era of Islam (Badeu, 1983).

Somewhat different from the Umayyad Dynasty which tended to be Arab-centric, the Abbasid Dynasty greatly absorbed foreign influences, particularly from Persians, Jews, and Nestorians. The religions of Christianity, Islam, Judaism, and Buddhism became the dominant world religions. Christians were represented by Willibrord and Bede (Sarton, 1927) in the West and John of Damascus, Yahya al-Dimashqi in the Near East. Willibrord spread Christianity to the north of the Lower Rhine and Denmark, while John of Damascus wrote *The Fountain of Knowledge* and other theological works which had a strong influence not only on the Greek Church but also on Islamic and Jewish theology. Because of this condition, inter-religious and intercultural societies flourished. The influence of Persia was particularly pervasive, and as a consequence, the Persians influenced the Caliphate in terms of love for

beauty, urbanity, intellectual curiosity, and enjoyment of discussion. This was very conducive to the advancement of science (Kettani, 1984). Unfortunately, this freedom of thought was often followed by an increase in immorality and disrespect for women. Unlike the Alexandrian era, when most elite still used native languages, during the Baghdad era elites were required to use foreign languages. Hence, they gradually adapted to the expression of new ideas.

The first century of the Abbasid Caliphate (750–850 CE) coincided with the 'golden age' of the Tang Dynasty in China (618–907), so a strong diplomatic partnership developed (Mansour, 2018). Chinese innovations in paper manufacturing spread to Tukharistan and Central Asian papermaking was closely associated with Buddhist institutions (Lin, 2011). During the second half of the eighth century, Jabir ibn Hayyan emerged as one of the leading figures of Islamic thought, undertaking research regarding alchemy, astronomy, botany, chemistry, literature, magic, medicine, Shi'ite philosophy, physics, and zoology. With the help of Alcuin, he carried out a number of educational reforms (Sarton, 1927). Because of development in science, the schools of Islamic law and theology emerged. The Hanafiyyah school was founded by Abu Hanifah in the second quarter of the eighth century, while the Malikiyyah school was opened by Malik ibn Anas who composed the work of *al-Muwaththa'*. Other Islamic figures that emerged in this era included Qadi Abu Yusuf who wrote *Book of al-Kharaj*, and Ja'far al-Sadiq who was also one of the Imams in the Shi'a who wrote treatises on alchemy. Abbasid caliphs, such as al-Mansur and Harun al-Rashid, strongly supported the development of science (Sarton, 1927).

It was in Lower Mesopotamia, Iraqi, and Arabia that the greatest intellectual activity could be seen. A new concentration of culture was achieved with renewed vigor in the created cities of Basrah, Kufa, and Baghdad. These three cities were comparable with Alexandria a few centuries earlier. The flow of knowledge was integrated into the Caliphate of the Abbasid from the Byzantine, Persian, and Indian Empires. According to Huff (2003), the advances of Baghdad in mathematics, astronomy, engineering, and other sciences were the most advanced in the world. However, this new concentration did not emerge as easily as it did in Alexandria where there was a preservation of Greek culture with a slight addition of foreign elements. By contrast, the vehicle of Islam's new civilization was a language that had never been used before for academic purposes. Almost all types of knowledge had to be translated from Greek, Sanskrit, or Pahlavi before it could be assimilated (Sarton, 1927).

Interfaith Cooperation Under Caliph Al-Ma'mun

The successor of al-Rashid, Caliph al-Ma'mun (reigned 813–833), became known as a patron of extraordinary science through interfaith cooperation even greater than Harun al-Rashid. He founded an observatory in the Tadmor plain, Palmyra to advance the science of astronomy (Sayili, 2005). In 829, al-Ma'mun introduced the practice of ancient Greek scholar, Eratoshenes of Alexandria, to measure the circumference

and diameter of the earth. In order to translate books from the Greek civilization, Caliph al-Ma'mun hired translators from the Christian and Sabi classes. He also permitted interfaith literary dialogues in the court (Bertaina, 2007). He established a team of scholars of different religions to collect and store manuscripts which were then translated into Arabic. And in order to accelerate the development of science, al-Ma'mun founded a multipurpose library first in the Muslim world called *Bayt al-Hikmah* (House of Wisdom) (Balty-Guesdon, 1994). This educational institution was open to Muslim and non-Muslim intellectuals to foster scholarly research through both primary texts and translations of original manuscripts, covering topics such as astronomy, mathematics, medicine, and philosophy (Osman, 2012).

Caliph al-Ma'mun collected as many Greek manuscripts as possible by sending messengers to the Byzantine Emperor, Leon the Armenian (813–820) in Constantinople, and commissioning the translation of these manuscripts into Arabic. He encouraged scholars from all disciplines and a large number of scientific works were placed under his protection. The assimilation of Greek scholarship was accelerated by the earnest efforts of three siblings, and they were children of Musa ibn Shakir, who collected and translated many Greek manuscripts (Sarton, 1927). A vast amount of maps, manuscripts, and books from ancient Greek, Persian, and Indian civilizations were eventually collected, including the writings of Aristotle, Euclid, Claudius Ptolemy, and the Al-Sind Hind book on mathematics (Algeriani and Mohadi, 2017).

Even though this era was referred to as the Islamic renaissance, the role of Nestorian Christian scientists was significant in reaching this stage. One Nestorian at *Bayt al-Hikmah* was Hunayn ibn Ishaq (or Joannitius, 809–877) who was fluent in Greek, Syriac, Persian, and Arabic. Introduced by Jibra'il Bakhtishu, the court physican, Caliph al-Ma'mun ultimately appointed ibn-Ishaq to be in charge of the academy and library, overseeing the translations from Greek and Syriac into Arabic (Samir, 2002). It is through these efforts that great thinkers emerged, especially in the field of science. This was manifested through the critical mindset and openness of al-Ma'mun who adhered to the Mu'tazilah school, which is known to be very rational in Islamic theology. During the Abbasid era (750–1258 CE), Arabic was used as a language of science, replacing Greek and Persian as administrative languages. Arabic was also the language of philosophy and diplomacy. As Watt and Cachia (1977) point out, medieval Christianity modeled its scholarship on Islamic intellectuals.

The Abbasids fostered cohesion within the scientific community and engagement with foreign cultures to advance their political goals (Hamidi and Mahdavian, 2020). The construction of government-funded study centers, such *Bayt al-Hikmah* in Baghdad, *Daar al-Hikmah* in Cairo, and Cordova University in Andalusia, were modelled on academies built by Plato, Aristotle's Lyceum, Alexander the Great's Museum, and Jundeshapur in Persia (Abdul-Aziz and Mohadi, 2020). As a result, Muslim scientists made substantial advances in mathematics, astronomy, chemistry, physics, medicine, biology, and technology. And as a result, mathematics and astronomy then developed in the Islamic world, Latin, Byzantine, and India. Scholars in these times were integrated figures in all sciences because it was impossible to separate mathematics from astronomy, and because almost every mathematician was an astronomer or an astrologer too. Many important steps were made in the field of

trigonometry especially for calculating astronomical tables. One leading and prominent Muslim scientist, al-Khwarizmi, became known as the 'father of algebra' (van der Waerden, 2013). About 830 he wrote the book *Hisab al-Jabr wa-l-Muqabala (Calculation by Completion and Balancing)* from which the term *al-jabr* was Anglicized to algebra (Eschenburg, 2020). Muslim doctor al-Razi became one of the greatest medical minds in history, being the first to distinguish between smallpox and measles, as well as pioneering pediatrics, obstetrics, and ophthalmology. He had over 200 publications, many of which became standard texts in European medical universities (Edriss et al., 2017).

Chemistry, physics, and technology continued to develop in China and the Islamic world, while medicine advanced in Byzantium, Japan, Latin, and Jewish culture. Arab scholars studied ancient manuscripts, adding their own innovations in medical science. For example, Abu Bakr Muhammad ibn Zakariyya ar-Razi (Rhazes) differentiated smallpox from measles, invented medicinal ointments, and wrote the famous thirty-volume *Al-Hawi* medical encyclopedia (Falagas et al., 2006). Islamic dominance became so pervasive that the ninth century was essentially a Muslim century, unmatched in literature, science, and philosophy (Hitti, 1987). Although intellectual activities in other regions still continued, the activities of Muslim scientists were the standard-bearers of civilization. Islam became the complete code of life for Muslim that impacts all human activities, including economic, social, political, moral, religious, and cultural values. The discoveries of Muslim scientists, attracted the attention of philosophers and scientists around the world (Singer, 2004). The impact was so extensive that European scholars gained knowledge on Greek civilization from Islamic rather than European sources (Al-Andalusi, 2015). In Iqbal's (1981) view, with the advent of Islam, an inductive study of nature emerged, and this has become a characteristic of the development of science using the methods of experimentation and observation ever since.

Arabic as the International Language of Academia

Owing to the polices of the Abbasids, Arabic was increasingly used in academic literature, even by non-Arabic speaking Christians, Jews, and Persians. Thus, Arabic became an intercultural vehicle for the development of science and continues to assist in medical research today (Shoja et al., 2015). In general, the first half of the eleventh century Muslims were preeminent in science, while philosophy was dominated by Jews. The progress of Islamic science was supported by Christian doctors living in Baghdad, such as Ibn al-Thayyib (Omar, 2015). However, in the second half of the century there emerged the figure of al-Ghazali, known as the greatest Islamic theologian who can be compared to Thomas Aquinas in the West.

After the era of Caliph al-Ma'mun, his half-brother, Caliph al-Mu'tasim (reigned 833–842) established a private army of Turkish slave-soldiers and became known as a warrior-caliph (Leiser, 2000). He likewise encouraged the pursuit of literary and scientific achievements through interfaith dialogue with non-Muslims. The nephew

of al-Ma'mun, Caliph al-Wathiq (842–847) maintained the tradition. However, this suddenly was terminated in the era of Caliph al Mutawakkil (847–861) who had a very strict attitude towards other faiths and the Mu'tazilites sect (Melchert, 1996). Even so, Caliph al-Mutawakkil continued to protect scientists, especially doctors. One of the greatest optical scientists was Ibn al-Haytham, or Alhazen (c965–1038) who is considered the father of modern optics and pioneer of the spectacles (Pūyān, 2014). He conducted experiments on light, colors, optic illusions, and reflection. Alhazen's publications were translated into Latin and spread across Europe (Hayes, 1983).

Islamic civilization in the field of science continued to develop in Persia, Egypt, Baghdad, and Andalusia. In Persia, the figures who emerged included al-Biruni (Shah, 2012). The Fatimid Dynasty in Egypt also became a scientific center of advancement (Brett, 2017). Baghdad came under the control of the Buwahid Dynasty (934–1062) also became a patron of science with scientific figures such as Nasr ibn Ya'qub, al-Baqillani, Ibn al-Husayn, al-Karkhi, and al-Kathi (Donohue, 2003). In the second half of the eleventh century, Islamic scholarship was still dominated by Persian tradition. However, it was somewhat different from the first half of which still used Arabic as a medium. Therefore, in the second half of this century Persian language began to be widely used. Scientific centers spread in Toledo, Saragosa, Seville, and Murcia (Sarton, 1927).

Given the above chronological picture of the cultural and religious contexts, it appears that the emergence of the Islamic civilization was greatly influenced by many factors. The increase and decline of civilizations are natural. However, interestingly the rise of a science was greatly driven by rulers who engaged with academics from other religions. These rulers functioned as patrons to extend the breadth of their political networks and financial support. What was done by the Abbasid Dynasty under Caliph al-Mansur, Caliph Harun al-Rashid, and Caliph al-Ma'mun was proof of the political support of the authorities and their willingness to be patrons of science. Even the smaller Islamic dynasties played a role in the progress of civilization in the field of science. What was done by the Buwayhid Dynasty, Fatimid Dynasty, Samanid Dynasty, and Umayyad Dynasty in Andalusia, and several other smaller dynasties is proof that they also played an important role in the advancement of Islamic civilization (Muqowim and Lessy, 2019). It is noteworthy that, unlike in the modern period more scientific advances emerged through individual figures rather than institutions. The emergence of the *madrasa* (religious institutions for training in Islam) was the turning point in the decline of scientific studies because this institution was widely used as a political tool for authorities (Findikli, 2022). In addition, science is based on critical reasoning which was considered a danger to the status quo of authorities. So, scientific exploration was done in secret.

Discussion

In the light of the information above, there are several important points to notice and reflect further related to the development of science, especially in the modern period. The Qur'an teaches the importance of studying the *kauniyyah* verses (the teachings of the scriptures about the universe). During the classical period, the development of science in Islamic civilization was strongly influenced by other civilizations before this religion was born either historically or culturally. The emergence of scientific progress was due to intensive interaction and communication with other civilizations such as the scientific traditions in China, India, Persia, Rome, and Greece. Therefore, learning from this fact, the development of science in the Islamic world should be carried out by collaborating and synergizing with other civilizations regardless of both their ethnic and religious background.

The next point is the importance of attitudes, inclusiveness, tolerance, and moderation in the context of the development of science in the classical period. There was a close cooperation between the rulers and the scientists, regardless of their religious backgrounds. Open and inclusive attitudes for policy makers in those periods greatly influenced the progress of science. In fact, they engaged all scientists with a variety of religion and ethnicity to transfer the field of science to the Islamic world. If this can be applied in the modern context in the Islamic world, the development of science is not only carried out exclusively based on understanding religious teachings. It considers the context of the reality in a plural society as basically the progress of science and technology is used for the benefits and common good of society.

In regard with the science and technology development in the Islamic Higher Education in Indonesia, the institutional transformation from an institute to a university is one of the important events and historic milestones. In 2002 State Institute of Islamic Studies (IAIN) Syarif Hidayatullah Jakarta transformed into Syarif Hidayatullah State Islamic University (UIN) and in 2004 Sunan Kalijaga State Islamic Institute (IAIN) transformed into Sunan Kalijaga State Islamic University (UIN) in Yogyakarta. Also, this situation happened to IAIN Malang transforming into UIN Maulana Malik Ibrahim in 2004. To put it another way, the three UINs became the pioneers of the development of science and technology at Islamic Higher Education Institutions because scientific traditions in those institutions at the level of institutes (IAIN) mostly emphasized more normative Islamic teachings, such as *tarbiyah* (education), *adab* (history and literature), *ushuluddin* (theology), *da'wah* (preaching), and *shari'ah* (Islamic law) (Muqowim and Lessy, 2021).

This transformation is basically the embodiment of a paradigm shift and a more integrative-interconnective philosophy of knowledge. At the level of institute, there was a tendency to dichotomous views or binary opposition in scientific development, especially in *naqliyyah* (transmission-based) sciences derived from normative scriptures and *'aqliyyah* (rational-based) sciences based on critical and historical rationality. Since the Islamic universities (UIN) have been established, the scientific tradition development is more aligned with an integrative-interconnective paradigm. According to this paradigm there is basically no dichotomy in the development of

science because *naqliyyah* sciences which is based on the *qawliyyah* verse (the text of the Qur'an and the hadith of the Messenger of Allah) and the science of '*aqliyyah* which is derived from the *kauniyyah* verse (natural phenomenon), both come from God (Suyadi and Sutrisno, 2018).

The application of the integrative-interconnective paradigm at UIN Sunan Kalijaga in relating to science and technology development seems clearly in the policies and programs to improve the quality of lecturers to study at universities in the myriad countries such as Japan, China, Germany, the Netherlands, Australia, and Canada. This policy is conducted to meet the need of new faculties such as Faculty of Science and Technology, Faculty of Islamic Economics and Business, and Faculty of Social Sciences and Humanity. In addition, various collaborative programs are also executed for scientific development through several activities for instance seminars, conferences, publishing and research. These developments cannot be separated from the role of university managers who are open, inclusive and moderate. However, the impact and achievements of those developments need to evaluate further because after all, the traditional scientific method of science and technology with an integrative-interconnective paradigm is the realm of a relatively new academic discipline.

Conclusion

The narrative on the development of science in Islamic civilization was strongly influenced by a complex network of academics from around the world. The willingness to learn from other civilizations was apparent from the strong enthusiasm of Muslim scientists, who established collaborations with other nations regardless of their religion, culture, faith, or other backgrounds. The multicultural spirit was not only discussed at the time but was implemented in the context of scientific development. This is an important lesson for the Islamic world today. The implication of this history is that every Muslim scientist should have an open mindset to collaborate with anyone regardless of their faith, belief, ideology, gender, sexual orientation, language, and nation, as well as engage in interfaith dialogue. This is exemplified by other civilizations, especially in Europe, who were inspired by and learned from the Islamic civilization in Baghdad. They modeled their scientific ethos on Muslim scientists and applied it in the West.

Political patrons today may be reminded of and encouraged by this open and science-friendly paradigm as they design and legislate policies and programs that advance scientific innovations. The transformation of many institutions from State Islamic Institute tradition into State Islamic University one became a concrete example that Islam is a dynamic system which its teachings can adapt to any situation. Today's phenomena in the state Islamic universities show advantages of being general universities because their elasticity can accommodate science and technology to be taught to students of Islamic teachings backgrounds, such as *pesantren*, to open their horizon to the development of science. Since year 2002, tens of state Islamic

institutions for Islamic studies under the Ministry of Religious Affairs have changed into Islamic universities that offer variety of disciplines and subjects, and the number of student enrollment tends to increase every year.

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