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**The Paradigm of Science Development at the Time of Al-Ma'Mun  
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**Abstract:**

Paradigm can be understood as a set of basic beliefs that lead to the action of scientific research. A person's paradigm of science, shows the attitude of behavior towards the science. Al-Ma'mun was one of the caliphs of the Abbasid State which was included in the golden age ( *The Golden Age* ). During the reign of the caliph al-Ma'mun, he did many things, especially in developing science. The benefit of this research is to provide information about the history of the paradigm of scientific development in Islamic education in classical times and is still relevant today. This research is entirely a literature study. The result achieved in this research is that the paradigm of the development of science during the caliphate of al-Ma'mun is an *integrated development* based on monotheism which sees science from an ontological aspect that discusses the universe which is structured as science (science), epistemologically with experimental methods ( *ijbari* ). and observations made in the laboratory, and axiology where Islam encourages and encourages humans to develop science (science) which is a unity from Allah SWT.

**Keywords: Paradigm, Development, Knowledge, Al-Ma'mun.**

**Paradigma Perkembangan Ilmu Pengetahuan Pada  
Zaman Al-Ma'Mun**

**Abstrak:**

Paradigma dapat dipahami sebagai sekumpulan keyakinan dasar yang mengarah pada tindakan penelitian ilmiah. Paradigma seseorang itu akan ilmu, menunjukkan akan sikap perilaku terhadap ilmu tersebut. Al-Ma'mun merupakan salah satu khalifah Daulah Abbasiyah yang termasuk kedalam zaman keemasan (*The Golden Age*). Selama pemerintahan khalifah al-Ma'mun banyak hal yang telah ia lakukan, khususnya dalam mengembangkan ilmu pengetahuan. Penelitian ini bertujuan yaitu mengungkap fakta tentang paradigma pengembangan ilmu dalam pendidikan Islam pada masa al-Ma'mun. Manfaat dari penelitian ini adalah untuk memberikan informasi tentang sejarah paradigma pengembangan ilmu pengetahuan dalam pendidikan Islam di zaman klasik dan masih relevan di masa kini. Penelitian ini sepenuhnya adalah studi pustaka. Hasil yang dicapai dalam penelitian ini adalah paradigma pengembangan ilmu pada masa khalifah al-Ma'mun merupakan pengembangan *integrated* berlandaskan tauhid yang melihat ilmu pengetahuan dari aspek ontologis yang membahas alam semesta yang disusun sebagai ilmu pengetahuan (sains), epistemologis dengan metode eksperimen (*ijbari*) dan observasi yang dilakukan didalam laboratorium, dan aksiologis dimana Islam menganjurkan dan mendorong manusia agar mengembangkan ilmu pengetahuan (sains) yang merupakan satu kesatuan dari Allah Swt.

**Kata kunci: Paradigma, Pengembangan, Ilmu, Al-Ma'mun.**

## INTRODUCTION

History has proven that Muslims are capable of mastering knowledge, science and technology beyond or beyond the capabilities of previous and other current ummahs. Muslims are able to master the science of medicine, astrology, exact science, natural science, arithmetic and various other disciplines. All these things cannot be ignored by the role of Muslim scientists who are always thirsty, digging, deepening, understanding, and searching for the various secrets of nature that are stored in the Qur'an. Al-Qur'an is designated as a source as well as a paradigm of thinking framework in developing knowledge by Muslim scientists.

The concept of paradigm develops knowledge in Islam, as has been done by the scholars and Muslim scientists in classical times (Nata, 2012: 4-5). On the other hand, during the peak of its glory, Muslims controlled world civilization, where at that time western countries were still in a period of darkness ( *the dark age* ) or rather approaching destruction (Dawson, 1962: 151). Countries are generally still in the grip of the influence of church dogmas which are very authoritarian, when viewed politically.

In the period of Islamic rule during its heyday, during the Abbasid dynasty, the Islamic government actually paid attention to the facilities for the transformation of knowledge. The development of science is very fast. Muslim scientists not only mastered the science and philosophy they learned from Greek books, but added to it the results of their own investigations. Thus emerged the scientists and philosophers of Islam. The emergence of Islam as a religion that oversees a goal to provide peace and prosperity for all mankind. Al-Qur'an is used as a source and framework for contemplating the power of Allah and developing science, science and technology for Muslim scholars.

Thus the development of science which subsequently gave birth to the paradigm of culture and civilization. The paradigm of the development of science at the time of al-Ma'mun through the development of natural phenomena of the universe produced natural science.

## RESEARCH METHODS

In this paper, following at least 4 steps in the historical research methodology, namely by:

1. *Heuristics* , namely finding and collecting objects or pictures from a period as a whole about data, facts and actual events.
2. Verification, i.e. getting rid of inauthentic materials.
3. Interpret or conclude reliable testimonies based on authentic materials.
4. *Historiography* , namely the preparation or writing of historical testimonies into a meaningful story or presentation.

Data, facts and events can be obtained from sources that can be accounted for based on historical methodology (Nata, 2011: 365). The final result that is expected from this paper is more *descriptive in nature*, that is, it provides a general and comprehensive picture of past historical events by appealing to the present.

## DISCUSSION

### A. *Biography of Al-Ma'mun*

His full name is Abdullah Abbas al-Ma'mun. Al-Ma'mun was born in the city of Baghdad on 15 Rabi'ul Awal 170 H/786 AD Coinciding with the death of his grandfather Musa al-Hadi and ascended the throne of his father Harun al-Rashid. Al-Ma'mun including the son of a genius, before the age of 5 years he was educated in religion and read the Koran by two well-known experts named Kasai Nahvi and Yazidi.

Al-Ma'mun was married to a former slave named Marajil from Persia. In addition to studying the Koran, he also studied hadith from Imam Malik in Medina. The book used is the work of Imam Malik himself, namely the book of *Al-Muwatha* . Besides that, he is also good at literature, state administration, law, philosophy, astronomy, and others.

Al-Ma'mun was a famous caliph in the history of the Abbasid dynasty. In addition, he is a brave warrior and a wise ruler. His reign marked the greatest progress in Islamic history. During his 20 years of leadership, he was able to leave a very valuable legacy of Islamic intellectual progress. Various aspects of progress in science, such as mathematics, medicine, astronomy, and philosophy.

Caliph Harun ar-Rashid entrusted Ja'far bin Yahya to be wise and forgiving. He was trusted to guide al-Ma'mun and proposed to Harun ar-Rashid to make him a caliph, which was then welcomed by Harun al-Rashid (Saefuddin, 2002: 41).

Al-Ma'mun is a person who plays a little. During the twenty months he lived in Baghdad he did not carelessly listen to the songs and songs that used to entertain in the palace. Al-Ma'mun apart from being a caliph, he was also a Muslim scientist, poet, preacher, muhadist, and proficient in philosophy and astrology. He can also master four languages other than Arabic, namely Greek, Hebrew, Persian, and Indian.

Al-Ma'mun himself served as caliph in 813 AD and was 28 years old. His reign was seen as a golden age that continued the greatness that his father had achieved. He is known for his intellect and love of science. His thirst for knowledge pushed him to occupy himself in studying various scientific and philosophical thoughts (al-Mas'udi, tt:5, Atsir, tt: 383).

### **B. *The paradigm of scientific development in Islam***

Paradigm in the building of science is also likened to a foundation in the framework of thinking to form a model in a theory of science. This paradigm is also then built the following theories. Furthermore, if scientists have accepted a certain paradigm, their research will be appointed to answer the problems that arise from that paradigm. Until a paradigm stops asking questions or appears more and more oddities that cannot fit within the framework of the paradigm in question. A new paradigm will produce another new theory (Jalaluddin, 2013: 148).

In John Ziman's view, the formation of this paradigm is very basic in nature for science. Without the commitment of each individual scientist about the same "world picture" , communication will not be created. In Western scholarship, the paradigm is derived from the results of human thought in the form of the commitment of scientists which is then formed as a *world picture* from their respective philosophical backgrounds (Jalaluddin, 2013: 250).

In the view of Islam, the *world picture* that is formed based on the commitment of these scientists, all stems from a single source, namely the messages of the holy book al-Qur'an. At least Harun Nasution said that the Qur'an is a complete, perfect, and all-



Islamic intellectuals. In this case the traditions referred to are 1) the tradition of researching *bayani* which produces religious knowledge (tafsir, fiqh, Qur'anic science, hadith science, etc.), *burhani* which produces social sciences (sociology, history, geography, etc.), *ijabari* which produces applied and science (chemistry, physics, mathematics, astronomy, biology, etc.), *adali* which produces philosophy and *irfani* which produces Sufism. 2) The tradition of scientific *rihlah* or long trips to gain knowledge. 3) The tradition of writing. 4) The tradition of debating, with the aim of getting new opinions (Nata, 2011: 38).

## 2. *Optimization of educational institutions during al-Ma'mun's time*

Islamic educational institutions during al-Ma'mun's time were categorized as Islamic educational institutions in the classical era. According to Charles Michel Stanton, there are at least two types of classical Islamic educational institutions, namely: formal Islamic educational institutions and informal Islamic educational institutions (Stanton, 1994: 122). It can be interpreted that the institution at the time of al-Ma'mun that had been formed was a general and special Islamic education system.

Islamic educational institutions can be grouped as follows:

*First*, *Maktab* or *Kuttab*, namely basic educational institutions. The subjects taught were *khat* or calligraphy, the Koran, faith, poetry. Before Islam came, *kuttab* had existed in Arabia before Islam, although at that time it was not widely known (Zuhairini, et al. 1997: 89). *Second*, *Halaqah*. A teacher sits in a chair leading a meeting and his students sit on the floor in a semi-circle around him, to listen to the teacher's delivery. *Third*, *Majlis* is an educational institution that is used for transmission activities from various disciplines. *Fourth*, mosques that function as teaching facilities have been known since the time of the Prophet Muhammad. *Fifth*, *Ribath* is a place of activity for Sufis who want to stay away from worldly life and concentrate fully on worship. *Sixth*, *Al-Manazil al-Ulama* (the houses of scholars. *Seventh*, the bookstore, acts as a place of transmission of knowledge and Islam. *Eighth*, *the Observatory* is a place for the study of Greek science and philosophy and other scientific studies. *Ninth*, the Library is a place for book collections and research. *Tenth*, *Zawiyah* is a small place on the outskirts of the mosque and is used to survive or be alone in order to find spiritual experiences.

## 3. *The emergence of important figures*

The emergence of important figures in developing science and advancing the civilization of the Islamic world who were contemporary with al-Ma'mun. The intellectual quality of a person is not necessarily the same between one and the other, even in the same type and level of education. It depends on how quickly each person absorbs the various knowledge he receives and tries to apply it in the middle of community life (Lisa'diya, 2006:101). As in the field of religion: Imam Shafi'I 767-820 AD (Jurisprudence), Imam Hanbali 780-855 AD (Jurisprudence), Muhammad ibn Sa'id d.834 AD (History/Hadith), Abu Huzail Al-Alaf 752-849 M (Mu'tazilah Theology), Imam Bukhori 810-870 M (Hadith). In the general field: Jabir ibn Hayyan 721-815 AD (Chemistry), Muhammad ibn Umar al-Waqidi 748-823 AD (History, jurisprudence and Hadith), Ibn Sa'ad, al-Khawarizmi 780-874 AD (Astronomy), al -Jahiz 776-869 AD (Literature), Hunayn ibn Ishaq 809-873 AD (Physics and medicine).

## 4. *The emergence of an intellectual tradition*

The emergence of the intellectual tradition during the time of al-Ma'mun, historically Muslims are the reporters of the rise of science, culture, and civilization. It was the Muslims who pioneered and acted as pioneers in developing religious and general knowledge in a comprehensive manner as during the caliph al-Ma'mun, who had restored the political, economic, social and other conditions so that they were stable. The occurrence of this condition was partly due to the fact that during the caliphate al-Ma'mun had revived, gave birth and developed a very diverse intellectual tradition, including: scientific research, researching, reading, writing, *munzarah* (debating), translating books and manuscripts, build libraries, build Islamic educational institutions, donate books, and study directly with teachers or sheikhs.

5. *The development of science and its influence on the progress system of Islamic society*

Understanding and the concept of Islam as a universal concept. All knowledge comes from one, namely Allah SWT as the source of all knowledge. Socio-culturally, the emergence of this tradition is related to the tradition of respecting and respecting scientists and scholars. As al-Ma'mun respects and respects freedom of thought and exploration of knowledge, both in terms of economy, security, comfort, social, politics and so on. At the time of the caliph al-Ma'mun there was no disintegration or dichotomous understanding of the separation of religious knowledge and general knowledge. The emergence of a dichotomous understanding occurred during the Caliph al-Mutawali who tended to the Ash'ariyah and abandoned the Mu'tazilah understanding and general sciences.

According to Ziauddin Sardar, one of the factors causing the dichotomy of the Islamic education system is the total acceptance of western culture along with the adoption of science and technology. Because those who hold this view believe that progress is the most important thing, not religion, therefore, religious studies are limited to discussing the individual's relationship with his god, other things are not religious matters (Hadi and Imron, 2000: 73).

At the time of al-Ma'mun, Islam was an effort to synergize or integrate knowledge, both religious knowledge and general science. Science is growing rapidly following Islamic culture as well. The scholars and scientists seem to be competing to gain knowledge and conduct research in order to produce new discoveries. This is nothing but the implementation of the Koran. Allah expresses such high appreciation to people who are knowledgeable without limiting the type of knowledge, in His word:

لِلَّهِ الَّذِينَ آمَنُوا الَّذِينَ أَلْعَلَّمَ اللَّهُ الْوَنَ ١١

"...Allah will surely exalt those who believe among you and those who are given knowledge by several degrees. ...". (Surah Al-Mujdah [58]: 11) (Ministry of Religion of the Republic of Indonesia, 2005: 543).

**D. Integrated Science (Science) Based on Tawhid in Al-Ma'mun's Period**

*integrated science* in the ontological, epistemological, axiological aspects used by scientists and scholars in classical times is as follows:

1. *The development of science based on ontological*

According to the Qur'an and hadith that the source of knowledge (ontology) of knowledge is not only the natural universe, social behavior The ontological aspect that is discussed is the universe (natural phenomena), social behavior (social phenomena) and thinking power (ratio). If the object is ontologically discussed revelation (al-Qur'an or hadith) using the *ijtihad* method. So it produces religious sciences such as: Theology, fiqh, interpretation, hadith, Sufism, etc.

Then if the object is ontological, which is discussed in the universe, then experts will find various theories that are compiled into natural science or better known as science, using experimental research methods in the laboratory. Then the science produced is natural science ( *Naturalsciencis* ) such as biology, physics, chemistry, astronomy, etc. (Nata, 2011: 337). By paying attention to the verses of the Qur'an and their explanations, it can be seen that the universe is a source of knowledge, especially science turns out to be a sign of Allah's power. , astronomy, chemistry, medicine, biology, botany, plantation and so on. Scientists find science is not the creator of knowledge, the creator is Allah. On the basis of an integrated view based on Tawhid.

## 2. *The development of science based on Epistemology*

According to the Qur'an and hadith, there are many ways to get the development of knowledge (epistemological). To obtain natural science based on the universe , the *ijabari method must be used*, namely observations and experiments carried out in the laboratory. In the epistemological view of the Qur'an about how to develop knowledge, it is different from what is stated in the West. In the West the development of science only uses the five senses based on empirical, reason, rational, and intuition. So in Islam all tools to achieve this knowledge must be accompanied by inner purification (Shihab, 1997: 438)

## 3. *The development of science based on Axiology*

In the field of axiology of science, that the Qur'an informs other than religious and general knowledge that it comes from Allah SWT. And it must be realized in the context of worshiping Allah SWT. And it must also be accompanied by having certain traits and characteristics, among which the most prominent is the characteristic of the charisma, namely perseverance and admiration for Allah SWT.

The axiological aspect is to be grateful for the knowledge given by Allah SWT by using it for noble purposes. Thus, Islam also recommends and encourages mankind to develop any kind of knowledge, so that they become religious experts, political experts, economists, education experts, biologists, medical experts and so on with the provisions and rules of that science embodied in the framework of worshiping Allah SWT through the use and purposes of humanity, creating social welfare, increasing human dignity and building morals which are an integral part of Allah SWT. The model of science development in al-Ma'mun's time was centered on natural science (science).

## 4. *Integration of Science in the Age of al-Ma'mun*

The integration of science during al-Ma'mun's time was a golden age in terms of science which still united general science with religious science based on the aspect of monotheism. This indicates that there is no dichotomy towards science, with an *integrated movement pattern* during al-Ma'mun's time creating and creating a scientific atmosphere, where scientists or scholars can master more than one discipline ( *encyclopedic* ) or can master various branches of science.

Table. 1: The Development of Science and Scientific Civilization at the Time of Al-Mansur, Harun Al-Rashid, Al-Ma'mun of the Abbasid dynasty.

Field of science	Science Development			
	Al-Mansur	Harun al-Rashid	Al-Ma'mun	Main Character
fiqh	Answering various problems, overcoming differences in social conditions, politics, customs, traditions	Answering various problems, overcoming differences in social conditions, politics, customs, traditions	Answering various problems, overcoming differences in social conditions, politics, customs, traditions	Shafi'i (d.320 AD) Ahmad Ibn Hambali (d.885 AD)
Interpretation	-	-	Codification of interpretations systematically	As-Suda (d.810 AD)
Sufism	Self-purification	Self-purification	Self-purification	Zunnun al-Misri (d.869 AD)
Nahwu	Arabic mastery	Arabic mastery	Mastery of Arabic in reading and interpreting the Qur'an	Al-Fara (d.845 AD)
Kalam/Theology	Savior of Hellenistic culture	To strengthen or oppose Christian theology	Mu'tazilah flow as the official school of the State. (think with sense/ratio)	Abu Huzail al-'Alaf (d.820 AD)
Mathematics	First brought from India through a book entitled "Sind qwa Hind"	Used for Islamic Shari'ah law (zakat and inheritance)	Used for calculating time, protractor, zero, measuring space etc.	Al-Khwarizmi (780-850 AD)
Medical	Kholifah often invites doctors from India, Egypt, Syria, to translate Greek medical books	- Developing health sciences, and medicine, building medical education	- Developing health science to cure disease	Hunain bin Ishaq (809-873 AD)
Philosophy	It has existed since the time of Muawiyah, but has not been	Translation of Greek works	Developing the study of philosophy, which thinks rationally, as	Al-Kindi (804-874 AD)



	developed as an integration between Islam and culture		the center of science, the basic mu'tazilite school of the State	
Astronomy	As a determinant of the location of the Qibla or Kaaba	Used for fortune telling. Like the political line of the caliphs	Observatory of the system of motion of celestial bodies and measurement of the circle of the earth	Al-Khwarizmi (780-850 AD)
Chemical	Discovery of terms for liquids and solids	As the science of liquids, solids and gases	As a differentiator of solids, metals, sulfuric acid, etc	Jabir bin Hayyan (731-815 AD)
History	As a recorder of an event at the palace	As a recorder of an important event in the palace	As a writer of scientific methodology based on the logical sequence and details of events	Ibn Sa'id (d.845 AD), Ibn Hisham (d.380 AD)
Music	Entertaining the Caliph	Entertaining the caliph and royal celebrations	Entertaining the caliph and royal guests	Ishaq al-Washili
Literature	Beauty in speech	The art of speaking	The art of speaking	Al-Jahiz (776-869 AD)

## CONCLUSION

From all the explanations above, it appears that the Paradigm can be understood as a set of basic beliefs that lead to the action of scientific research. A person's paradigm of science, shows the attitude of behavior towards the science. Al-Ma'mun was one of the caliphs of the Abbasid State which was included in the golden age ( *The Golden Age* ). During the reign of the caliph al-Ma'mun many things he has done, especially in developing science. This study aims to reveal facts about the paradigm of the development of science in Islamic education at the time of al-Ma'mun. Caliph Al-Ma'mun's steps in developing science, namely: 1) The movement of science translation of al-Ma'mun's era. 2) Optimization of educational institutions. 3) The emergence of important figures. 4) The emergence of intellectual traditions. 5) The development of knowledge and its influence on the progress system of Islamic society.

The integration of knowledge at the time of al-Ma'mun was a golden age in terms of knowledge that still unites general knowledge with religious knowledge based on the aspect of monotheism. This indicates that there is no dichotomy of knowledge, with the *integrated movement pattern* at the time of al-Ma'mun creating and creating a scientific

atmosphere, where scientists or scholars can master more than one discipline of science ( *encyclopedic* ) or can master various branches of science.

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