ISSUE
MAY 2020

E-ISSN: 2684-8139

Islam Universalia

International Journal of Islamic Studies and Social Sciences

Vol 2
NO. 1
MAY 2020

https://www.ejournal.cyberdakwah.com

Received: *30 April 2020;* ***Revised:*** *21 May 2020;* ***Accepted:*** *27 May 2020*
Published: *29 May 2020*

THE HISTORY OF KNOWLEDGE DEVELOPMENT IN EAST (ISLAM) AND WEST

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Abstract

This article aims to find out the history of the development of science from time to time recorded by existing historical literature and mentions some of the figures behind the discovery of scientific theories and their development. The phases of the development of science are called periodization in the history of the development of science starting from ancient times, middle ages, modern times and contemporary times. While the phases of the development of science in the Islamic world began from the time of the Prophet, Khulafau Ar-Rashidin, the Umayyads, Daula Abbasids and the revival of Islam until now. When science in the European world suffered a setback but on the contrary what happened in the Islamic world of science developed rapidly until the peak of glory.

Keywords*: Islam, West, Knowledge Development.*

Introduction

The development and progress of human civilization cannot be separated from the role of science. Whether it's a change in lifestyle from time to time, along with the history and development of science itself. History in question is the history of science which is an important factor in human life. Thus, there

is a need for earnest effort and moral and academic responsibility in the presentation of history.

The development of science on this earth is something that cannot be denied. Humans are the main determining factor for the development of science. In development, it must experience upheaval that is not always stable. Many factors influence humans to make a development, people who are sensitive to world problems will appreciate all the factors and differences that exist.

Science in the European world and in the Islamic world has developed from since ancient times to contemporary times, we must know the history of the development of science as a benchmark of learning in the present for change in the future.

The author in this article would like to describe the history of the development of science from time to time recorded by existing historical literature and mention some of the figures behind the discovery of scientific theories and their development.

History of The Development of Science in The Western World

The development of science up to now has not taken place spontaneously but through a gradual and evolutionary process, thus to understand the history of the development of science, it must divide the classification periodically. Each historical period of the development of science displays certain characteristics, theoretical development of science always refers to civilization,

the period of the development of science begins in ancient times, medieval times, modern times and ends in contemporary times.

1. Ancient Science

The oldest era of scientific growth is the Ancient Age which stretches between the years ± 4000 BC to 400 AD. Ancient Age was basically divided into three parts, namely: (The Liang Gie, 1998: 25)

A. Egyptian and Babylonian Period (± 4000 - 600 BC)

Since around 4000 BC human civilization began to gradually develop. Two centers of civilization that are important for the growth of knowledge are Egypt in the Nile and Babylonian valleys along the Trigis river.

Various scientific ideas from the knowledge of Architecture, Science, Compute Science, and Measurement Science began to grow in Egypt, all these sciences are important for the purposes of building various temples, palaces, and pyramids, in addition to surgery and medical science also began to be developed in Egypt, while in Babylon developed various scientific ideas from Star Science and Definite Science.

The Scientific Idea in Definite Science developed by the Babylonians among other things is the use of zero numbers and the position that determines the value of a number.

One thing that seems striking in the growth of science in the days of Egypt and Babylon is that the name of the individual

or inventor or creator of a scientific idea was never mentioned, and something that is also still attached to the growth of science in the first period was the existence of occult explanations. For example, medical science that was developed in the days of Egypt and Babylon knew healing with supernatural powers in addition to drugs and surgery.

The planets studied are often associated with various spiritual powers, Egyptian and Babylonian priests also divide the sky in twelve environments with various astrological signs called zodiacs, which are used to predict one's life line.

Based on the explanation above, it can be concluded that in the days of Egypt and Babylon there was no growth of science in the modern sense, something that was born and developed was a variety of basic understandings and scientific ideas which were then followed by reviewers in the next period, namely the era of ancient Greece.

B. Ancient Greek Period (600-30 BC)

In contrast to the Egyptian and Babylonian Period which did not leave the names of scientists whose explanations are still partly mysterious, while the growth of science in ancient Greece (600-30 BC) already knew who the developers of science and place and year of birth. Likewise reviewers of scientific explanation without relying on various explanations that are supernatural.

The changes that occur can be seen from the birth of some philosophical scientists, but before that it needs to be stressed that in those days the understanding of philosophy was broader than it is now. Understanding philosophy includes all human knowledge, including Science, Physics, Social Sciences, Law and so on. (Slamet Iman Santoso, 1977:30)

1) Thales (625-545 BC)

One of the leading scientists was Thales from the city of Miletus, who was dubbed as the first scientist in the world because he pioneered the birth of the Star of Science, Weather Science, Sailing Science, and Measurement Science with a variety of important inventions and discoveries.

Thales developed a natural philosophy called cosmology, this philosophy questions the origin, assembly, and nature of the universe, in his opinion all originating from water as the basic ingredients of the universe. He also expressed the opinion regarding Star Science that the moon shines because it reflects light from the sun.

2) Pythagoras (578-510 BC)

The ancient Greek scientist who was also very well known was Pythagoras, a definite science expert who pioneered the number theory and proved the postulates intelligently with a mind to make measuring science an example of the logic of form.

Pytahagoras drew on a mystical school known as Pythagoranism in Crotona, he revealed the philosophical

teaching that all materials of all forms are numbers, which in turn are condensed into a proposition which reads: "Numbers rule the universe (Number rule the universe)". And among the theories of Pytahagoras which remains eternal and is known by everyone to this day, the Dalil Pytahagoras which reads: "The sum of the squares, the two sides of a right triangle are the same as the squares of the hypotenuse" or can be written with the formula: a2 + b2 = c2.

3) Democritus (470 - 400 BC)

Another scientist from the ancient Greek era whose scientific ideas were famous until modern times was Democritus, while his famous scientific ideas about atoms. According to Democritus's theory, all objects in the world are made up of atoms together with the space between them, they are eternal, very small, and cannot be further divided into smaller units.

4) Socrates (470-399 BC)

Socrates argued that teachings and life are one and cannot be separated from one another. Therefore, the basis of all research and discussion is self-testing. For Socrates, valuable knowledge is self-knowledge. His most favorite motto is what is written on the Delphi Temple, namely:"Know yourself". (Amsal Bakhtiar,2005:29).

5) Plato (427-347 BC)

Plato, who lived in the early fourth century BC, was the earliest philosopher (earlist) whose writings still existed, he was a very influential mathematical propagandist, in the Republic he argued that geometry prepared the mind for dialectical conversation about real ideas (the real idea), which sensory objects are none other than the shadows, and from there to wisdom and illumination. (Jerome R. Ravertz, 2004:10).

Knowledge according to Plato is not the result of sensory observation, because the world we observe is only a shadow of the world of ideas, so our knowledge that comes from physical reality is blurred. Sensory knowledge cannot open the way for understanding of real reality (the world of ideas).

6) Aristotle (384-322 BC)

Aristotle was a student of Plato, a philosopher who succeeded in finding solutions to the great problems of philosophy united in one system; logic, physics, metaphysics, and mathematics. Through accurate observations and disciplined theorizing, he created a taxonomy that is mostly similar to the science we use today. (Jerome R. Ravertz, 2004:10).

Aristotle explained about knowledge that sensory knowledge is the basis of all our knowledge, there are no natural ideas that precede it and not shadow knowledge as Plato said.

C. Roman Period (30 BC - 400 CE)

In 30 BC after Caesar ruled Egypt, the Roman period began, this period was the last of the growth of science in ancient times and also the period that contributed the least to the history of science in ancient times.

The Roman nation was proficient in engineering and management skills by building bridges and waterways and regulating law and governance, but this nation did not produce a leading scientist. The Romans paid attention to practical questions and ignored scientific theories, so as to cause no scientists to develop science except two people, that was also the Greeks: Galen and Ptolemy.

1) Galen (129-199 AD)

Galen pioneered the Physiology and Body Sciences studies, he put forward the standard of guessing about the ups and downs of blood in the human body and the standard of guessing about the three spirits in the human body, namely animal spirits that control the mind, vital spirits that regulate movement, and natural spirits derived from food which has been digested.

Galen was also a brilliant logician of his day by writing various essays on the subject of logic and giving a sharp review of the works of logic from Aristotle. His writings include titled Introduction to Dialectic. (The Liang Gie, 1998: 25)

2) Ptolemy

Ptolemy is an expert in Star Sciences, Earth Sciences and Definite Sciences. His theory about the earth as the center of the circulation of stars including the sun also had a great influence until the Middle Ages and the Enlightenment. The theory was written in a major work which became known as the Almagest.

According to Ptolemy the earth became the center of the moon, the sun, and the five stars that were known at that time, including: Jupiter, Mars, Mercury, Saturn, and Venus, as well as all the other stars in the sky. The circulation of stars that seem to move backwards from Earth is explained by Ptolemy with the theory of the epicycle motion. In this theory each planet moves on a circle whose center moves on another circle whose center is the earth.

The development and birth of Christian Religion in the Roman Period that spread the teachings of hope and compassion, most people began to gradually crave a good life in knowing the Divine truth and people's attention to natural phenomena increasingly diminished. Around the year 300 AD ended interest in the sciences except the Science of Religion, and in 390 AD there was the destruction of part of the library of Alexandria. The collapse of the Roman Empire in the 5th century ended the growth of science in Roman times and ancient times.

2. Science in the Middle Ages

The history of medieval science began sometime in the 5th century until the early 17th century. Historians generally determine the year 476, namely the end of the Western Roman Empire which was centered in Rome and the emergence of the Eastern Roman Empire which would later be centered in Constantinople (now Istanbul), as early data from the Middle Ages and 1492 (the discovery of the American continent by Columbus) as the final data. (Simon Petrus L. Tjahjadi, 2004:102).

This period begins with the birth of European philosophy. As was the case with Greek philosophy which was influenced by belief, philosophy or thought in the Middle Ages was influenced by Christian belief. That is, medieval philosophical thought was dominated by religion. The solution of all problems is always based on religious dogma, so that the philosophical thinking style is theocentric.

God created the universe and the time of eternity, the idea of creation does not conflict with the eternal realm. Scripture teaches that the universe began, but philosophy does not prove that, just as philosophy cannot prove that the universe did not begin. (Rizal Mustansyir, 2009:67)

The term Medieval itself (which only appeared in the 17th century) actually only serves to help us to understand this era as a transitional period (transition period) or the middle age between two important eras after and before, namely the Ancient Age

(Greek and Roman) and the Modern Age, which began with the Renaissance in the 17th century.

Medieval philosophy is characterized by the close relationship between Christianity and philosophy. (Simon Petrus L. Tjahjadi, 2004:102). Taken as a whole, medieval philosophy is indeed Christian philosophy. The thinkers of this time are almost all clergy, namely clergy or monks in the Catholic Church (eg bishops, priests, abbots, monks), their interest and attention devoted to the teachings of Christianity.

The medieval period has striking differences from the previous century. The difference mainly lies in the dominance of religion. The emergence of Christianity taught by the prophet Isa at the beginning of the century BC brought great changes to religious beliefs.

Christianity is a philosophical problem because it teaches that God's revelation is the true truth. This is different from the view of the ancient Greeks who said that kebanaran can be achieved by the ability of reason. They don't know about revelation yet.

Regarding attitudes towards Greek thought are twofold: (Surajiyo, 2005:156)

1) The group that totally rejects Greek thought, because Greek thought is a pagan thought because it does not recognize revelation.
2) Accepting Greek philosophy which says that because humans are God's creations, human wisdom also means

wisdom that comes from God. Perhaps reason cannot reach true truth. Therefore, reason can be helped by revelation.

The history of medieval philosophy is divided into two eras or periods, namely the pratistic period and the scholastic period. (Simon Petrus L. Tjahjadi, 2004:103).

A. Patristic (100-700)

Patristic comes from the Latin word prates, which means the Church Fathers, was a Christian religious expert in the early centuries of Christianity characterized by the Church's hard work to articulate, organize, and strengthen the content of Christian teachings and defend it from attacks by infidels and heretics. the Gnosis. For the Church Fathers, Christian teaching is a true philosophy and a revelation at the same time. The attitude of the Church Fathers towards Greek philosophy ranged from acceptance and rejection. The cruel persecution of Christians and essays that attack Christian teachings made the early church fathers react apologically to the Christian faith by studying and using philosophical ideas.

As a result, in the course of time, there was a mutual reaction, the Christianization of Hellenism and Hellenism of Christianity. That is, to explain and defend the teachings of the Christian faith, the Church Fathers used Greek philosophy as a means (helenism "in Christianity"). However, as such, elements of the thinking of Hellenism culture, especially Greek

philosophy, can enter and play a role in the field of Christian faith and shape it (Christian teaching "in Greece" through Greek philosophical argumentation style and pattern). For example, Justin Martyr saw Christ's "Prophet and Martyr" in socratic. In contrast, for Tertullian (160-222), there was no relationship between Athens (a symbol of philosophy) and Jerusalem (a symbol of theology of Christian teaching). For Origen (185-253) divine revelation is the end of human philosophy that can be wrong. According to him people should only believe something as truth if it does not deviate from the church's traditions and the teachings of the apostles. In the 5th century, Augustine (354-430) appeared. His teachings which were strongly influenced by neo-platonism were a source of inspiration for medieval thinkers after him for around 800 years.

This patristic era experiences two stages: (Surajio, 2005:157)

1. The beginning of Christianity. After experiencing various difficulties, especially regarding Greek philosophy, Christianity established itself. Going out strengthens the church and into establishing dogmas.
2. The philosophy of Augustine who was a famous philosopher in the patristic period. Augustine saw dogmas as a whole.

The end of the historical era of Ancient Western philosophy with the close of Plato's Academy in 529 by Emperor Justinian, essays from the Fathers of the Church were

successfully preserved and bequeathed in the monasteries of that era and hundreds of years after, practically becoming intellectual centers thanks the monks' skill in reading, writing and copying them into Latin-Greek and the availability of library facilities.

B. Scholastic 800-1500

The Scholastic Age began in the 9th century. If Patristic figures are individuals who through their writings give shape to the philosophical and theological thinking of their day, Scholastic leaders are students from the royal-school environment and cathedral school founded by King Karel the Great (742-814) and later also from the university environment and monks' orders.

The word "scholastic" refers to a period in the Middle Ages when many schools were founded and many great teachers appeared. However, in a more specific sense, the word "scholastic" refers to a certain method, namely "the scholastic method".

This method is used to solve various problems and questions sharply and rationally, the pros and cons are determined and then the solution is found. Demands of plausibility and careful and critical study of inherited knowledge are characteristic of Scholastic philosophy. (Burhanuddin salam, 1995:91).

This period is divided into three stages (Surajio, 2005:157):

a. Early Skolstical Period (800-120)

Characterized by the formation of methods that were born because of the close relationship between religion and philosophy. What appeared at the outset was the question of universalia. The teachings of Augustine and neo-Platonism have wide and strong influence in various schools of thought.

This period, attempted to prove the existence of God based on pure ratio, so without based on the Scriptures (Anselm and Canterbury). Furthermore, Aristotle's logic was applied to all fields of scientific study and the "scholastic method" with pro-contra began to develop (Peter Abaelardus in the 11th or 12th century). The problem that was hotly discussed at this time was a universal problem with the confrontation between "Realism" and "Nominalism" as the problematic background. In addition, in the 12th century, there were theoretical thoughts about natural philosophy, history and language, mystical experiences of religious truth also took place.

The influence of Arabic thought has an important role in the development of philosophy. In the years 800-1200, Islamic culture succeeded in preserving the legacy of the works of philosophers and scientists of Ancient Greece. The intellectuals and the Islamic royal circles translated the works from Greek into Arabic. Followers of Islam came to Europe (through Spain and the island of Sicily), one of the Islamic thinkers was Muhammad Ibn Rushd (1126-1198). But long before Ibn Rushd, an Islamic

philosopher named Ibn Sina (980-1037) tried to make a synthesis between neo-Platonism and Aristotelianism.

Based on this idea, in turn, the opportunity for medieval Christian thinkers to open up Greek philosophy more fully and more thoroughly than before was opened. This is increasingly supported by the existence of monasteries who want to translate, copy, and maintain literary works.

b. The peak period of scholastic development (13th century)

The peak period of scholastic development was influenced by Aristotle due to the arrival of Arab and Jewish philosophers. Aristotle's philosophy gives the dominant color to medieval thought. Aristotle was recognized as the Philosopher, the Greek style of thought was increasingly accepted, the breadth of the horizon of thinking was increasingly challenged through disputes with Arab and Jewish philosophy. The first universities were founded in Bologna (1158), Paris (1170), Oxford (1200), and many more universities followed. In the 13th century, a great synthesis was produced from the treasures of Christian thought and Greek philosophy. The characters are John Fidanza (1221-1257), Albertus Magnus (1206-1280), and Thomas Aquinas (1225-1274). The result of this large synthesis is called summa (whole).

c. Late or late Scholastic Period (14-15th century)

The scholastic period The end of the 14-15 century marked by Islamic thought that developed towards nominalism was a school of thought that universalism did not give clues about the same and general aspects of the existence of things. People's trust in the ability to give answers to problems of faith began to diminish. There is a kind of belief that faith and knowledge cannot be combined. The ratio cannot account for the teachings of the Church, only faith can accept it.

One of the critical thinkers in this period was William of Ockham (1285-1349). This member of the Franciscan order sharpened and re-warmed the issue of nominalism that had previously been discussed. Furthermore, at the end of this period, a thinker from the area now included in Germany, Nicolaus Cusanus (1401-1464). He presents the "knowledge of ignorance" in the style of Socrates in his critical thinking: "I know that everything I can know is not God". The thinker who has a great interest in Ancient Greco-Roman culture is the one who set us into a new era, namely the Modern Age, which is the Modern Era that was started by the Renaissance, the "rebirth" of Greco-Roman culture in Europe starting in the 16th century , after 1200 philosophy developed again thanks to the influence of Arabic philosophy which was passed on to Europe.

Entering the 14th century until the 16th century called the Renaissance or the epiphany, it was marked by the rebirth of all scientific and human knowledge that came from the ancient

Greeks, many ancient manuscripts of knowledge that were stored in the Christian churches reappeared and still in the original language.

Science that developed forward at this time was the field of astronomy. Famous figures such as Nicolaus Copernicus (1473-1543 AD), Johanes Kepler (1571-1630 AD), Galileo Galilei (1564-1643 AD), Andreas Vesalius (1514-1564), and Roger Bacon (1561-1626 AD). Regor Bacon argues that experience is the main foundation for the beginning and final test of all science. Mathematics is an absolute requirement for processing all knowledge. (Fuad Ihsan, 2010:204)

Whereas Nicolaus Copernicus (1473-1543), he is considered to be the foundation of modern Star Science. Ideas in the field of Science and philosophy and the thinking of people are called the Copernican Revolution.

The revolution carried out by Copernicus was to change the earth as the center of the circulation of the stars put forward by Ptolemy and fully embraced by the Christian church with the new theory that the sun is the center and the earth surrounds the sun as well as other stars. This theory was first put forward in a pamphlet entitled Little Commentary in 1512.

The theory of the beginnings from 1512 was then worked on in further detail with a variety of observations and calculations, in 1543 it was only published a book that shocked the world with the title De Revolution Orbium Coelestium (Circulation of celestial bodies). Copernicus's theory in

subsequent developments had an enormous impact on human thought.

Along with the death of Nicolaus Copernicus, another scientist named Andreas Vesalius (1514-1564) was born, he also published a book called De Corporis Humani Fabrica (About assemblies in the human body). This book is an atlas in Body Sciences that describes carefully the composition of the human body and at the same time points out some of the mistakes made by Galen scientists in Roman times.

The historians of science consider that the publication of the books Nicolaus Copernicus and Andreas Vesalius in the epoch of enlightenment became the starting point of the growth of science that has developed in modern times until now. (The Liang Gie, 1998: 73).

3. Science in the Modern Age

Beginning in the 17th century the end of the enlightenment of the world entered the modern age, the development of science in this era is different from the previous era, the development of science is caused by three things, namely changes in the human mind, technological progress, and the birth of scientific procedures.

Since modern times Europeans have gradually abandoned the old minds who still believed in superstition, used occult explanations, and followed the mystical realm. Scholars and scientists began to hold on to the ability of the human mind to

fully explain various natural phenomena or problems, the ability of reason was further supported by the development of rapidly advancing technology. Various objects resulting from technological advances and then become an extension of the ability of human reason.

Entering the 20th century, the growth of science in the world experienced significant developments, various kinds of discoveries were born from the results of research scientists who provide benefits to humans, both in Medicine, Natural Sciences, Chemistry, Literature, and Economics, so that scientists received the Nobel Prize. (The Liang Gie, 1998: 86).

There are some scientists who are very meritorious and famous in modern times, among others:

A. Sigmund Freud (1856-1939)

A very famous and famous scientist in the field of Psychology. He developed psychoanalytic procedures for addressing psychiatric symptoms in humans. His famous writings are Studien uber Hysterye and Die Traumdeutung, both books published in English as Studies in Hysteria and The Interpretation of Dreams.

B. John Maynard Keynes (1883-1946)

Economist who is famous for his work The General Theory of Employment, Interest and Money. In his book, a modern macroeconomic theory was developed, hereinafter known as Keyney's Economics.

C. Franz Boas (1858-1942)

Scientists born in Germany then moved to the United States in 1886. He was a pioneer of General Human Science who stressed the importance of gathering material about various old cultures from backward tribes.

D. Noam Chomsky (1928)

Scientists who pioneered a language and argued that the language developed by humans is the result of the ability in itself that is universal.

E. Rene Descartes

Rene Descartes is an exact science expert, his discovery in exact science is a system consisting of two straight lines X and Y in a flat plane, so his discovery is called Analytic Geometry. In connection with the philosophy of Rene Descartes distinguish three ideas that exist in humans, namely: first, innate ideas are ideas brought by humans from birth, second, adventious ideas are ideas that come from outside the human self, third, factitious ideas are ideas generated by the mind itself. Rene Descartes' motto is cigoto ergo sum (I think, then I am there) and de omnibus dubitandum (doubt everything). (Fuad Ihsan, 2010:89)

F. Isaac Newton

Isaac Newton played a role in modern science, especially his discoveries in three fields, namely the theory of Gravity, Calculus calculations, and Optics.

G. Charles Darwin

A fanatical follower of the theory of evolution, he states that the developments that occur in creatures on earth occur due to natural selection. His famous theory is Struggle For Life (the struggle for life).

Thus the development of science in the Modern Age in the course of history from the 17th century to the 20th century. That development shows that science in the Western world is always advancing and developing rapidly.

4. Science in the Contemporary Age

The difference between modern times and contemporary times is that the modern era is the era of the development of knowledge that began around the 15th century, while the contemporary era is the era of the latest developments that occur until now. (Amsal Bakhtiar,2005:68).

The development of science in contemporary times is developing very fast. Each scientist develops his scientific discipline with a variety of inventions. (Fuad Ihsan, 2010:210)

Famous scientists of the era include: Albert Einstein, a famous physicist of the 20th century, he said that nature is infinite in size and unlimited, but also does not change its totality status or is static over time. Einstein believed in the immortality of matter, thereby denying the creation of nature.

But in 1929, another physicist named Hubble showed that the universe was not static but dynamic by conducting a new study, he used binoculars in the world's largest stars to see

galaxies in the universe with a speed proportional to its distance from the earth so he undermined the theory Einsten.

In addition to theories about physics and theories of the universe, this contemporary era is also marked by the discovery of various advanced technologies. Communication and information technology is one that has experienced rapid progress, from the invention of computers, communications satellites, the internet, and printing presses.

One of the amazing and controversial results of technology is genetic engineering in the form of cloning technology. Dr. Gurdon of the University of Cambridge was the first to carry out this technology in 1961. Gurdon managed to manipulate frog eggs so that they grow into tadpole clones. In 1993, Dr. Jerry Hall successfully cloned a human embryo with cleavage techniques. In 1997, Dr. Ian Wilmut successfully cloned the first mammal by giving birth to a sheep named Dolly. The same year was born the first cloned ox which was given mana Gene. In 1998, researchers at Hawai University led by Dr. Teruhiko Wakayama has successfully cloned rats for more than five generations. In 2000, Prof. Gerald Schatten succeeded in making a cloned ape named Tetra. After the success of various cloning techniques that have been done, experts even plan to implement cloning techniques in humans. (Amsal Bakhtiar,2005:76).

On the other hand in this contemporary era, the development of science is also marked by the occurrence of increasingly sharp specialization of science, as a result of the

more specialization of science, the narrower field of study coupled with various restrictions in the study, this is what causes the symptoms of professionelle deformation namely changes in the shape of a being seen from professional glasses. (Fuad Ihsan, 2010:213)

History of the Development of Science in the Islamic World

Musyrifah Sunanto in his book "Classical Islamic History: The Development of Islamic Science" says that the development of science in the Islamic world occurred in the classical Islamic era, between 650-1250 AD. This happened since the Prophet Muhammad spread his treatise until the destruction of Baghdad in the XIII century AD. (Musyrifah Sunanto, 2011:6).

1. Science in the time of the Prophet and Khulafau Ar-Rashidin

The Prophet was very concerned about science, he became a revolutionary example of how it should develop knowledge. The first revelation he received read reads to be the basic foundation in carrying out his mission. This command is essentially the declaration and eradication of illiteracy, an initial action that frees humanity from ignorance.

Al-Quran is a core source of knowledge, because the Al-Quran contains the story of the previous Ummah, all kinds of

basic laws relating to marriage, civil, criminal, commercial, political, economic, social, and various other legislation.

With the guidance of the Prophet and the influence of the Koran, smart people were born. Many of the Companions of the Prophet became famous for their abilities, including Umar bin Khattab, Ali ibn Abi Talib, Zaid bin Thabit, Ibn Mas'ud, Ibn Umar, Ibn Abbas, and Aisha. (Musyrifah Sunanto, 2011:21)

They are all experts, even though they have different abilities and expertise. Umar bin Khatab has expertise in determining the law, is very genius in managing government institutions, clever in governing a country that is so broad, and very good at dealing with new problems that had never existed during the time of the Apostles and Abu Bakr.

Umar bin Khatab also ordered to make Arabic grammar to avoid mistakes in reading the Koran and Hadith. Ali bin Abi Talib became the first builder of the foundations of nahwu science which was further refined by Abu al-Aswad al-Duwaly. Besides the importance of nahwu science to interpret the Koran in order to avoid mistakes in understanding it. So some friends acted to interpret the Koran. They are Ali bin Abi Talib, Abdullah Ibn Abbas, Abdullah bin Mas'ud, Ubay bin Ka'ab, then they are considered as the first commentators in Islam.

2. Knowledge during the Umayyad Period

One aspect of culture at the time of the Umayyads was to develop knowledge, if the time of the Prophet and Khulafau Ar-

Rashidin focused on efforts to understand the Koran and the Hadith of the Prophet to deepen the teaching of aqeedah, morals, worship, muamalah, and the stories of Al- Quran, then during the Umayyad period the attention to knowledge was in accordance with the needs of the times that were aimed at the sciences that were handed down by the nations before the advent of Islam.

During the reign of Khalid bin Yazid, he was very interested in chemistry and codex, so he provided a number of treasures and ordered Greek scholars who settled in Egypt to translate kimai and codecteric books into Arabic. This effort became the first translation in history.

Supporting knowledge not only from the original Arabs but also supported by non-Arab groups, it is precisely this group that changed the scientific system, the study has also expanded so that the sciences are as follows: (Musyrifah Sunanto, 2011:41)

a. Knowledge in the field of religion is all knowledge that comes from the Koran and Hadith
b. The science of history is all the science that deals with life's journey, stories, and history.
c. Language science is all knowledge that studies languages, nahwu, sharaf, and others.
d. Philosophy is all knowledge that generally comes from foreign nations such as science, medicine, chemistry, astronomy, arithmetic, and other related sciences.

Thus, at the time of the Umayyads science was already a skill, entering the field of understanding and thinking that required systematic and compilation.

3. Science During the Abbasid Daula

X century AD was called the century of Islamic daulah development where the Islamic world, from Cordova in Spain to Multan in Pakistan, experienced development in all fields, especially in the fields of science, technology, and art. While the western world is in the dark.

The movement to build knowledge during the Abbasid Daula was massively initiated by the caliph Ja'far al-Mansur. After he founded the city of Baghdad (144H / 762 AD) and made the capital of the country. Then he attracted many scholars and experts from various regions to come and live in Baghdad, he stimulated efforts to book the Science of Religion, a case of fiqh, interpretation, monotheism, hadith, or other sciences such as linguistics and historical science.

Science during the Abbasid Daula was classified into two, namely Naqli Science and Aqli Science.

A. Naqli Science Development

Naqli is a science derived from the Koran and Hadith, this science was compiled based on its formulation around 200 years after the Hijriyah. Among Naqli Sciences, namely:

1) Interpretation

Al-Quran is the main source of Islam, therefore all the behavior of Muslims must be based on it, it's just that not all Arabs understand the meaning contained in it, because to understand a book that is not enough just to understand the language alone but it is necessary to balance the level of knowledge between books that are read by the reader. Famous Mufassir during the Abbasid period included: Ibn Jarir at-Thabary. Ibn Athiyah al-Andalusi, As-Suda, Abu Bakr Asma, and Abu Muslim Muhammad bin Nashr al-Isfahany.

2) Sufism

Sufism is one of the sciences that grew and developed during the Abbasid period, the core of his teachings were devoted to worship by surrendering fully to Allah, leaving the pleasures and adornments of the world, and quieting themselves in worship. Famous Sufism experts during the Abbasid period included: Al-Qusyairy and Syahabuddin.

3) Linguistics

Linguistics grew and developed during the Abbasid era because Arabic became an international language. Linguistics requires a comprehensive knowledge, which is used in linguistics is nawu, sharaf, ma'ani, bayan, badi ', arudh and insha'. Among the famous scholars in this period were: Sibawaihi, Muaz al-Haro, and Abu Usman al-Maziny.

4) Fiqh Science

The Abbasid era, which was the golden age of Islamic civilization, gave birth to the most famous fuqaha in Islamic history with its famous fiqh books. Fuqaha at that time included: Imam Hanafi, Imam Malik, Imam Shafi ', and Imam Hambali.

B. The Development of Aqli Science

Aqli is a science based on thought, Muslims learn this knowledge from foreign translations, such as Greek, Persian, or Indian. Indeed in the Koran there are the basics of this knowledge but Muslims know this knowledge after learning from the outside.

Translation activities, most of the writings of Aristotle, Plato, Galen, as well as essays about other Greek sciences can be read by Islamic scholars. Starting from the translated book, the experts among the Muslims developed research and thought so that they mastered all the various sciences and philosophical thought and developed speculative thinking within limits that did not conflict with the truth of revelation.

Since that time the formation of Islamic sciences in the field of aqli began, which is often called the golden age which lasted between 900-1100 AD, the knowledge belonging to aqli science includes:

1) Medical science

Medical science began to receive attention when the Caliph Al Mansur in 765 AD. Famous scientists as Islamic doctors include: Al-Razi and Ibn Sina.

Al-Razi in the West was known as Razes, when he was still young Al-Razi lived as a chemist and then as a doctor of medicine. Essay books of no less than 200 volumes, most of which are about medical science, one of Al-Razi's most popular works is a medical encyclopedia called Continens.

Meanwhile Ibn Sina also wrote a book about medicine which was named Al-Qanun. This book became a standard in European medicine until 1650, this book was written in a very systematic and meticulous manner, so that the book can last for so long. (Fuad Ihsan, 2010:202)

2) Philosophy

Among the Muslims the first person to give an understanding of philosophy and its division was Al-Kindi. According to Al-Kindi that knowledge is divided into two parts, namely: First Divine knowledge (Ilm al-Divine) is direct knowledge obtained by the Prophet from God, the basis of this knowledge is belief. The second is human knowledge (Ilm Insani) or called philosophy, the basic knowledge is thought (ratio-reason). (Maftukhin, 2012:86)

Philosophy for Al-kindi is knowledge of the truth (knowledge of truth), at this point the similarity between

philosophy and religion is seen, the purpose of religion is to explain something that is true and good, the goal is the same as the goal of philosophy, religion in addition to the revelations using reason, philosophy also uses reason.

Other figures who have contributed to the philosophy of science are Ibn Rushd or Averos who translated and commented on Aristotle's work, from his writings it is proven that Ibn Rushd followed the flow of evolutionism, that is, a belief that everything in the world was not created suddenly and in a state of completion , but everything happens through a process and development so that eventually it is in a finished state. (Fuad Ihsan, 2010:202)

Imam Ghazali is recognized by modern Western scholars and Islamic scholars as accomplished and the most original thinkers in history, due to his efforts to criticize all-out thinking of theology (theology) based on Greek philosophy, which according to him can mislead Muslim aqeedah. So was born his book entitled "Tahafutul Falasifah" (The ambiguity of philosophers' thoughts), with the aim of fortifying Muslims from the danger of excessive free thinking (liberal) which resulted in them leaving worship. For this role he was dubbed the "Hujjatul Islam" (Islamic Arguments).

3) Astronomy

Caliph Al-Ma'mun in the early IX century AD built an astronomical observatory under the leadership of Sind bin Ali and Yahya bin Abi Mansur, astronomers and this institution not only made a systematic observatory of the movements of celestial

bodies in the universe, but also proving precisely the fundamental elements contained in the almagest, namely the irregular line of motion and the path of the sun and the length of the shamsiyah year. Among the well-known figures are: Al-Fazari, Al-Farghani, Al-Battani, and Al-Biruni.

4) Arithmetic

Al-Khawarizmi was the one who compiled the book Algebra in 825 AD, and also wrote a book about ordinary calculations (arithmetic). The book opened the way in Europe to use the decimal method, which replaced writing with Roman numerals, Khawarizmi had also introduced the second square equation in algebra. And there are still many Muslim figures who have been instrumental in developing arithmetic to date.

5) Optics

Abu Ali al-Hasan bin al-Haytam, a famous scientist in the field of optics, the Europeans knew him as Alhazen, through experiments of his theory of light and light, Alhazen discovered a magnifying lens. He argues that a round concave or a round convex and a cylindrical glass or a taper mirror can be used to find where an object is located, from the glass it can obtain the return of light in a particular eye. Alhazen also invented telescope glass and microscope glass. (Musyrifah Sunanto, 2011:41).

6) Chemistry

The famous father of chemistry is Jabir bin Hayyan, he departed from an assumption that basic metals such as lead, lead, iron, and copper could be transfused into gold or silver because of a mysterious substance. He devoted all his energy to conduct investigations and experiments to prove the allegation.

Summary of this period is the period of Islamic civilization reached its peak, especially in the field of science. At the same time, conditions outside of Islam, especially in Europe, are undergoing a period of darkness. In the XI century Europe began to realize that there was a high Islamic civilization in the East, so they tried to take it. Through the Spanish channels, the island of Sicily, and the fugitives of the Islamic Civilization were gradually brought to Europe. This is what led to the emergence of European renaissance which then brought progress and civilization of the West now, and the Islamic world at that time was in a state of retreat and static until the modern period of 1800 AD, where the Islamic ummah began to enter the Islamic revival era.

4. Science in the Age of Islamic Awakening

The twentieth century Islamic world was marked by a resurgence of cultural, scientific and political decline and weakness after European forces dominated them. Europe was able to colonize because of its success in implementing the science and technology strategy and managing various government institutions.

Napoeleon Bonaparte occupied Egypt in 1798 AD, since that time Muslims began to feel and realize their weaknesses and setbacks, so that reformers were born in the Islamic world at that time, based on the ideas of reformers in general can be categorized into three types pattern: (Fadil SJ, 2008:245)

1) The pattern of renewal which is oriented towards Western civilization, basically this pattern holds that the source of strength and progress achieved by the western world is the result of the development of science and technology that had developed during the heyday of Islam. Therefore, to restore the power of Islamic civilization, modern science and technology can only be achieved through an educational process that memorizes the pattern and system of modern Western-style education, as in the past the Western world has also imitated and developed the Islamic education system. The pioneers of this first pattern were Sultan Mahmud II (1807-1839) from Turkey, Sir Sayyid Ahmad Khan from India, and Muhammad Ali Pasya from Egypt.

2) The pattern of renewal oriented towards pure Islamic sources, this pattern was pioneered by Muhammad bin Abdul Wahab, then continued by Jamaluddin Al-Afghani, Muhammad Abduh, and other figures. These figures are of the view that renewal in the lives of

Muslims can be done by referring back to the Koran and the Sunnah, Muhammad Abduh said that Islam is in line with modern science, because the basis of modern science is the sunnah of God, while the basis of Islam is revelation God. Modern science and Islam are sourced from God, therefore Muslims must master both.

3) The pattern of renewal which is oriented towards nationalism is based on the fact that Muslims consist of various nations with the assumption that Islamic teachings apply in all situations in all nations that have different cultural environments, then the view of nationalism is not contrary to Islam.

The struggle movements carried out by these figures have not yet achieved the desired result of independence, but the echo of Islamic thought greatly colored the era of the next generation to liberate the country from western colonial penetration and develop science throughout the world.

Conclusion

From the explanation above, the writer can conclude thatScience is a part of classified, systematic and measurable knowledge that can be proven empirically. Meanwhile, knowledge is the whole knowledge that has not been arranged, both regarding metaphysical and physical,and history is a record

of all the series of events that have occurred, which serves as a revealer of everything in accordance with facts.

The phases of the development of science are called periodization in the history of the development of science starting from ancient times, middle ages, modern times and contemporary times. While the phase of the development of science in the Islamic world began from the time of the Prophet, Khulafau Ar-Rashidin, the Umayyads, Daula Abbasids and the revival of Islam until now.

The development of science on this earth is something that cannot be denied. Humans are the main determining factor for the development of science. In development, it must experience upheaval that is not always stable.

When science in the European world suffered a setback but on the contrary what happened in the Islamic world of science developed rapidly to the height of its glory, even though so due to various factors that affect humans so that the knowledge in the Islamic world also suffered a setback which eventually gave birth to pioneers known as reformers who tried to develop knowledge again so that science has come to us today.

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