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**Islamization Of Science and Scholar who Have An Impact In The
World Of Science**

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Abstract

This paper presents a discussion of the contribution of muslim scientists to the development of modern science. It is well known that in the golden ages of Islam many scientists are very competent in their respective fields emerging. They succeeded in emerging as philosophers and scientists capable of filling various fields of science, such as medicine, mathematics, chemistry, physics, and so forth others. Their scholarship is valuable especially for the development of science in the future. So precious their scholarship and what they dedicated, so not infrequently the scientists who come later dub them as the father of science in their respective fields. However, not all of them will be discussed in this paper, but only the cholars of muslim scientists, Their contribution is so great to the development of modern science and is recognized by scientists both in the East, and especially in the West.

Keywords; Islamisasi science; and contribution csholars of muslim.

**Islamisasi Sains dan Para Cendikiawan yang Memiliki Impact
Dalam Dunia Sains**

Abstrak

Tulisan ini menyuguhkan pembahasan mengenai kontribusi ilmuwan-ilmuwan muslim bagi perkembangan sains modern. Sudah jamak diketahui bahwa pada zaman keemasan Islam banyak bermunculan ilmuwan yang sangat kompeten di bidangnya masing-masing. Mereka berhasil tampil sebagai filosof dan saintis yang mengisi berbagai bidang keilmuan, seperti kedokteran, matematika, kimia, fisika dan sebagainya. Keilmuan mereka sangat berharga terutama bagi perkembangan sains pada masa-masa berikutnya. Begitu berharganya keilmuan dan apa yang dipersembahkan oleh mereka, sehingga tidak jarang para ilmuwan yang datang belakangan menjuluki mereka sebagai bapak sains di bidangnya masing-masing. Namun, tidak semua dari mereka akan dibahas dalam tulisan ini, melainkan hanya para cendikiawan ilmuwan muslim Kontribusi mereka begitu besar bagi perkembangan sains modern dan diakui kalangan saintis, baik di Timur dan

Kata Kunci; Islamisasi Ilmu dan kontribusi Ulama Muslim.

PRELIMINARY

Islam gives a very high appreciation of reason. So high that reason puts an important position in the design of Islamic discourse. From that, reason is always juxtaposed with revelation in many occasions and discussions. With that, it is only natural to say that Islam highly values science. Of course the product of the use of reason is science. From reason and thinking power that has been given by God, so that humans can explore various knowledge that exists in the universe, both large and small. Thus emerged various disciplines.

In this case the history of Islam proves by the large development of science from various branches and the emergence of hundreds or even thousands of Muslim scholars. Islam's appreciation of reason and science is not just small talk, because it has been carried out and practiced by an extraordinary number of scholars, or Islamic scholars. In such a conducive situation, it has succeeded in presenting several prominent Muslim philosophers, such as Ibn al-Haytham, Jabir ibn Hayyan, Ibn Sina, Al-Zahrawi, Ibn al-Nais, Al-Farghani, Jabir Ibn Hayyan and a number of experts in their respective fields. – respectively.

A. Formulation of the problem

- a) What is meant by Islamization of science?
- b) What impact did the scholars in the Islamization of science have on the world of science?
- c) What contributions have scholars made in the Islamization of science?

B. Problem Goal

- a. To know what is meant by the Islamization of science?
- b. To find out what impact the scholars have in the Islamization of science on the world of science?
- c. To find out what contributions scholars have made in the Islamization of science.

C. Islamization of Science

The dynamics of Islamic thought have become increasingly visible since it was triggered in two important ways. The first is the encounter with modern western customs such as European *imperialism* from Islamic countries. The second is seen from the internal needs of Muslims themselves, both for the spirit of integration or also for other strategic needs. In the context of Islamic renewal, there are two different patterns initiated by thinkers in the map of Islamic thought. First, in order not to want to be left behind by Muslims in a civilization that is now being seized by the West, the pattern of transmission of knowledge in Islamic education must follow the pattern developed by the west because the west is considered successful in the development of education both from the style of education and the thoughts that underlie the existence of education. known as the philosophy of education. The second is to think that it is okay to take something that comes from the west to catch up with the transmission of knowledge and education, but it must be based on Islamic values and epistemology.

In essence, talking about the Islamization of science is not a new discussion in the world of science. This term has been developed by Islamic thinkers who are in direct contact with modernization as a product of western science, so that they see and feel the gap in knowledge between East and West.

From the first time the idea of Islamization of science emerged, it reaped a lot of controversy, starting from the implementation procedure, vision and mission, and the form of its realization. On the one hand, the project of Islamization of science is indeed *visionary* and *utopian*. But, on the other hand, it requires understanding, study, and re-examination in order for this project to produce truly original and effective works.

The process of Islamization of Science in carrying out the Islamization of science, according to al-Attas, needs to involve two interrelated processes. First, separating the key elements and concepts that make up Western culture and civilization, and second, incorporating Islamic elements and key concepts into each relevant branch of modern science. Al-Attas rejects the view that the Islamization of science can be achieved by labeling science and Islamic principles to secular science. Such efforts will only make things worse and have no benefit as long as the "virus" is still in the body of science itself, so that the resulting knowledge will float. Islam is not and neither is secular. Whereas the purpose of Islamization itself is to protect Muslims from contaminated knowledge that misleads and causes errors.

The Islamization of knowledge aims to develop the true Muslim personality, thereby increasing a Muslim's faith in Allah, and through this Islamization will lead to security, goodness, justice and the strength of faith. According to Al-Faruqi, Islamization is an attempt "to redefine, restructure data, rethink arguments and rationalizations related to the data, reassess conclusions and interpretations, re-project goals and do all of this in such a way that these disciplines enriching Islamic insight and benefiting the cause. To match his ideas on the Islamization of science, al-Faruqi put the "principle of monotheism" as the framework of thought, methodology and way of life of Islam. The principle of monotheism was developed by al-Faruqi into five kinds of unity, namely, the unity of God, the unity of creation, the unity of truth and knowledge, the unity of life, and the unity of humanity.

In general, the Islamization of science is intended to provide a positive response to the reality of modern science which is secularistic and Islam which is too religious, in a whole and integral new knowledge model without separation between the two. As a reference for this effort, Al-Faruqi established a framework with five objectives in the context of the Islamization of knowledge, namely, First, Mastery of modern scientific disciplines. Second, mastery of the treasures of Islamic heritage. Third, build the relevance of Islam with each modern scientific discipline. Fourth, combining the values and treasures of Islamic heritage creatively with modern sciences and Fifth, directing the flow of Islamic thought to paths that achieve the fulfillment of the pattern of Allah's plan.

D. Scholars Who Have Impact in the World of Science

a) Ibn Nafis

Ibn Nafis' full name is al-Din Abu al-Hasan Ali Ibn Abi al-Hazm al-Qarshi al-Dimashqi. He is usually called Ad-Dimasyqi, because he was born in Sham and in his youth he lived in the city of Damascus. He is also called Al Mishri, because he spent most of his life in the city of Cairo and has strong ties to Egypt and its inhabitants. In addition, he also has another nickname, namely The Second Avicenna (Second Ibn Sina), given by his fans.

Ibn Nafis was born in 1213 in Damascus. Another reference says he was born in Syria in 607 H (1210 AD). He spent his childhood in the city until he became an adult. He lived and remained in Egypt until his death. The contribution of Islamic civilization in the medical world is very valuable. In its golden era, Islamic civilization has given birth to a series of prominent thinkers and doctors who laid the foundations of modern medical science. The Islamic world is also recorded as the first civilization to have a hospital managed by professional figures. The world of Islamic medicine in the caliphate era left many works that became world scientific literature.

Al-Nafis' contribution to medicine is not only in the field of physiology, but he also contributes as a doctor who supports experimental medicine, postmortem autopsy, and human surgery. History also records Al-Nafis as the first doctor to explain the concept of metabolism. So he then developed the Nafsian school of medicine on systems of anatomy, physiology, psychology, and pulseology. The Nafsian school that was created aims to replace the medical doctrines initiated by its predecessors, namely Ibn Sina alias Avicenna and Galen - a Greek doctor. Al-Nafis considered that many of the theories put forward by the two famous doctors were wrong. Among other things about the pulse, bones, muscles, five senses, stomach, bile canal, and other body anatomy.

b) Ibn Sina

Ibnu Sina Abu Ali Husain bin Abdullah bin Sina or Ibnu Sina was born in (370-429 H/980-1037 AD), known in the Western world as Avicenna and also "Prince of Doctors". He earned the title Al-Shaikh Al-Ra'is (Leader of the Wise) given by his disciples and Hujjat al-Haqq (Proof of the Truth/God), which continued to be known in the East by that title. Ibnu Sina was also once nicknamed Medicorum Principal or the Royal King of Doctors by the Latin Scholastics. Ibn Sina is famous in the fields of medicine and philosophy. In the middle ages, Ibnu Sina wrote his autobiography, which was later completed by his student, as well as his secretary and friend named Abu Ubayd al-Juzjani. The autobiography/biography was then spread by a number of biographers, such as Al-Baihaqi, Al-Qifthi, Ibn Abi Ushaibi'ah and Ibn Khallikan. Ibnu Sina was born in the year 370 H (980 AD) in Afshanah, a small village near Bukhara, the capital of the Samaniyyah Dynasty, now in Uzbekistan (part of Persia).

Ibn Sina's father named Abdullah who came from Balkh, and married Sitarah. The couple had three sons, Ali, Al-Husain (Ibn Sina), and Mahmud. When Ibn Sina was 5 years old, the family moved to Bukhara during the reign of Nuh ibn Mansur. In this city, his father was appointed Governor of Khormithan, a village on the outskirts of Bukhara City. And Ibn Sina came from an Ismaili sect family. Although Ibn Sina's thoughts were influenced by the Ismaili sect, he was an independent person, he had his own views and

was independent in finding the nature of truth, both in the philosophical branch and in the religious branch.

Ibn Sina had extraordinary intelligence and memory, so he could catch up with the knowledge of his teachers at the age of 14 years. As explained at the beginning of this chapter, Ibn Sina has an important role in the world of Islamic science. Its influence is seen wherever and whenever philosophy and science are developed in the Islamic world. The influence of Ibn Sina's philosophical thoughts as in his works of thought and studies in the field of medicine was not only focused on the Islamic world but also penetrated into Europe. Ibn Sina's contribution to thought and science was enormous. This had a significant impact on the scientists, thinkers and philosophers of later generations.

Among his most prominent students was Abu Ubaid al-Juzjani, a companion who accompanied him throughout his life, with whom Ibn Sina dictated his autobiography to his pupil. And he also finished his master's unfinished work; Abu al-Hasan Bahbanyar, author of the most important works on philosophy, Kitab al-Tahshil and Kitab al-Hujjah; Ibn Zailah, who wrote a review of Hayy bin Yaqdzan and summarized Al-Syifa.

Throughout the Safavid period, there was an intellectual and artistic revival, during which Ibn Sina's philosophy received special attention from influential figures such as Mir Damad who sought to provide an Illuminationistic interpretation; Sayyid Ahmad Al-Alawi who wrote an extensive review of Al-Syifa. Ibn Sina's concepts of plague were continued by Ibn Baytar of Andalusia, the greatest Muslim botanist and pharmacologist, who bequeathed many of the most famous Medieval medical books on Botany. These medical books are Kitab Al-Jami' li Mufradat Al-Adwiyyah (a complete book on simple medicines and an adequate book on simple medicines). He wrote in it as many as 1,400 kinds of drugs.

Thus, in the Islamic world Ibn Sina's contribution in the field of medicine can open the way of medicine widely. Ibn Sina's contribution cannot be separated from the golden age of Islam which took place in the year (287-494 H/900-1100 AD). The golden age is a popular term for the era of scientific development as a continuation of the era of translation and writing of medical books (131-288 H/750-900 AD). The golden age occurred during the Abbasid dynasty. The most monumental development of the achievements of the Abbasid dynasty is the extraordinary progress in the field of rational thought.

c) Al-Zahrawi

Full name Abu al-Qosim Khalaf Ibn-Abbas Al-Zahrawi. He was born in 936 in the city of Al-Zahra, Spain and died in 1013 AD. In the city of Cordoba he studied, taught medicine, treated people, and developed the science of surgery. The world is currently awarding him as the "Father of Modern Surgery".

Al-Zahrawi is a phenomenal surgeon, his work and ideas were adopted by doctors in the Western world. Al-Zahrawi is famous as a Spanish Muslim doctor and surgeon, whose knowledge was developed during the reign of Abdur Rahman III (1912-961 AD). Among Muslim doctors he is known as a pioneer in the science of recognizing diseases (*diagnostie*) and ways of healing (*the repeutic*) ear diseases. He has pioneered ear

surgery to restore hearing function, by paying close attention to the anatomy of the fine nerves (*arteries*), blood vessels (*veins*) and muscles (*tendons*). Not only that, he is also known as a pioneer in the development of dermatology (*dermaphology*). Az-Zahrawi contributed to the field of medicine and pharmacy by authoring books, including: Kitab At-Tahsrif li Man Arjaza an at-Ta'lif (Medicine Manual or *Medical Vademecum*). This book explains and clearly illustrates the diagrams of no less than 200 pieces of surgical equipment.

From the illustrations depicted in the books he wrote, it can be seen that he has used many types of equipment for dental treatment. At the end of one of his books, which consists of 30 chapters, he discusses wounds and surgical procedures, about the treatment of fractured bones, about dental diseases as well as how to treat them, about burning wounds and cleaning the blood in the uterus after giving birth. This book became the basis for laying the foundations for the development of dentistry in Europe. This book describes in detail and straightforwardly about surgery, *orthopedics*, *ophthalmology*, *pharmacology* and general medical science. He also explores about cosmetics. Kitab al-Mansur. This book is partly about the manufacture of drugs by sublimation and distillation. In fact, this book until the 15th century AD, is still packaged in the syllabus of medical studies at the University of Tubingen.

d) Ibn Al-Nais

Ibn al-Nais was born in Damascus in 1213 but eventually moved to Cairo, at that time owning only some of the most advanced hospitals in the Islamic world, including the al-Mansuri hospital where Ibn al-Nais was chief physician. He wrote a book of medical science which is believed to have made him rich and replaced Ibn Sina's Kanun as the standard book of medicine in the world.

Islam, however, did not exert the same influence in Europe. But more importantly he wrote a commentary on the work of Galen and Ibn Sina, correcting whatever he saw as their fault, for example the problem of the pulse. But its fame among historians in the Western world stems from a discovery in 1924 that caused some scholars to rewrite the history of medical science. In 1924, the manuscript of Ibn al-Nais's book Syarh Tasrih al-Qanun (Comments on Anatomical Sciences in Ibn al-Qanun Ibn Sina) by Ibn al-Nais, written in 1242, was found in the Prussian State Library in Berlin. Galenus (and later Ibn Sina) believed that blood leaked through one chamber of the heart into the other through a small opening in the septum that divided the two chambers. After examining many hearts, either alone or with witnesses, Ibn al-Nais could not find such a hole.

Then he concluded that the blood in the right ventricle of the heart must flow into the left ventricle through the lungs and not through a small hole as Galenus had stated. Ibn al-Nais has discovered what is called the pulmonary transit in this era or also known as the small circulation. Some writers and historians believe that Ibn al-Nais actually discovered the circulation of blood. Other experts, such as historians of medicine *Emilie Savage-Smith of Oxford University* and *Peter Porman of Warwick University* say that the discovery of pulmonary transit is not the same as discovering the circulation of blood, which was done by William Harvey in 1628. Perhaps that is because Ibn al-Nais described

its flow. is one-way it does not say that the blood returns from the left ventricle to the right. In fact, Ibn al-Nais had been part of the last generation of great medical scientists in medieval Islam.

e) Abu Ali Al Hasan Ibn Haytam

Ali Al-Hassan Al-Haytham or Ibn al-Haytam was born in Iraq. Ibn al-Haytam was born in Al-Basrah in 354 Hijri or 965 AD and died in 1039 AD in Cairo, Egypt. Alhazen was a scientist, mathematician, philosopher, astronomer, and polymath from the golden age of the Islamic Empire. Ibn al-Haytam's youth coincided with the control of Egypt by the Fatimid Caliphate. The control of Egypt by the Fatimid Caliphate began after its success in conquering the Nile valley in 969 AD, in the end Egypt became the new capital of the Fatimid Caliphate.

Ibn al-Haytham is a scientist who likes to do research. His research on light inspired Western scientists such as Boger Bacon, and Kepler, the inventor of the microscope and telescope. He was the first person to write and discover various important data about light. Several books about light that he wrote have been translated into English, among others *Light on Twilight Phenomena*. His studies discuss a lot about twilight and the many halos around the moon and sun as well as shadows and eclipses.

Several experiments were carried out by Ibn al-Haytham, including the experiment on burning glass, from which he got the theory of the magnifying lens. The theory was used by scientists in Italy to produce the world's first magnifying glass and its principles have been adopted by scientists since then. Ibn al-Haytham is also alleged to have conveyed the existence of the earth's attraction or gravity before Isaac Newton knew it. In addition, Ibn al-Haytham's theory of the human psyche as a series of feelings that continues regularly has given Western scientists a clue to produce wayang images. His theory has led to the invention of the film which is then played back and forth to the audience as we can see it today. Ibn al-Haytham died in Cairo, Egypt, around 1040 AD. Because of his deep observations in the field of optics, his concepts became the basis of the science of optics. In addition, he ushered in optics in today's rapid advances. Thus, Ibn al-Haytham earned the nickname "Father of Modern Optics".

f) Al-Farghani

Al-Farghani was a very influential Muslim astronomer. His full name is Abu al-Abbas bin Muhammad bin Kalir al-Farghani. In the West, medieval astronomers knew him as al-Farghanus. The establishment of the al-Ma'mun Academy is one proof of the caliph's love for science. In this academy al-Farghani started a discussion on the science of astronomy. Al-Farghani's sincerity was followed by the caliph's support in the form of sophisticated stargazing equipment to determine the size of the earth and also make scientific reports.

Al-Farghani's career continued in astronomy. He successfully completed research to determine the diameter of the earth and the distance between the earth and other planets. In addition, he also helped design the presence of Darul Hikmah al-Ma'mun, took part in the project of measuring the latitude of the earth, describing the distances and

diameters of several planets. A very remarkable achievement at that time. The results of al-Farghani's research in the field of astronomy were written in various books. *Harakat as-Samawiyya wa Jawami Ilm an-Nujum* (Principles of Star Science) is one of his main works containing the study of the stars. Before the time of *Regiomontanus*, *Harakat as-Samawiyya wa Jawami Ilm an-Nujum* was one of the most influential books for the development of astronomy in Europe.

In the book, al-Farghani did adopt a number of Ptolemaic theories, but he developed them further to form his own theory. Not surprisingly, *Harakat a-Samawiyya wa Jawami Ilm an-Nujum* received a positive response from Muslim and non-Muslim scientists. This book has also been translated into various languages. *Harakat as-Samawiyya wa Jawami Ilm an-Nujum* which was translated into English underwent a title change to "*The Elements of Astronomy*"

g) Jabir Ibn Hayyan

Jabir ibnu hayyan He is a prominent scientist and philosopher whose full name is Abu Musa Jabir ibn Hayyan al-Azdi. Westerners are familiar with the name Geber. He was born in Thus Khurasan, Iran (Persia), in 721 AD or around the 8th century. Jabir is a man of Arab descent, but some also say that he is a Persian. When his father was rebelling, he was captured by the Umayyad Dynasty forces in Khurasan, then he was executed and sentenced to death. After his father died, Jabir and his family returned to Yemen and he began to study the Qur'an and various other sciences from a scientist named Harbi Al-Himyari.

Jabir returned to Kufa after the Abbasids succeeded in overthrowing the Umayyads and began his career in chemistry. His interest in this branch made him continue to study it so that he became an expert in chemistry. Jabir then studied medicine during the Abbasid Caliphate under the leadership of Harun al-Rashid from a teacher named Barmaki Vizier. Jabir continued to work and experiment in the branch of chemistry diligently in a laboratory near Bawaddah in Damascus with the characteristics of his experiments being carried out quantitatively, even the instruments used for his experiments were made of metal, plant and animal materials himself.

It was in his laboratory that Jabir managed to find various great discoveries that are very useful to this day, even in that laboratory his chemical equipment has also been found. Jabir's greatest contribution was in the field of chemistry. He acquired this skill by studying with Barmaki Vizier, during the reign of Harun al-Rashid in Baghdad. He developed the technique of systematic experimentation in chemical research, so that each experiment could be reproduced. Jabir emphasized that the quantity of a substance is related to the chemical reactions that occur, so it can be considered that Jabir has pioneered the discovery of the law of constant proportions.

Other contributions include improving the crystallization, distillation, calcination, sublimation and evaporation processes as well as developing instruments to carry out these processes. Some of Jabir Ibn Hayyan's discoveries include: hydrochloric acid, nitric acid, citric acid, acetic acid, distillation techniques and crystallization techniques. He also invented the aqua regia solution (by combining hydrochloric acid and nitric acid) to

dissolve gold. Jabir Ibn Hayyan was able to apply his knowledge in the field of chemistry to the manufacturing process of iron and other metals, as well as to prevent rust.

He was also the first to apply the use of manganese dioxide to the manufacture of glass. Jabir Ibn Hayyan was also the first to note that heating wine would produce highly flammable gases. This then gave way for Al-Razi to find ethanol. If we know the metal and non-metal groups in the grouping of compounds, then Jabir was the first to do so. He proposed three groups of compounds, namely: 1) "*Spirits*" which evaporate when heated, such as camphor, arsenic and ammonium chloride. 2) "*Metals*" such as gold, silver, lead, copper and iron. 3) "*Stones*" which can be converted into powder form.

CONCLUSION

Islamization of science is not a new concept in the world of science. This term has been developed by Islamic thinkers who are geographically in direct contact with modernization as a product of western science, so that they see and feel the gap in knowledge between East and West. The Islamization of knowledge is intended to develop the true Muslim personality so as to increase his faith in Allah, and with this Islamization will be born security, goodness, justice and the strength of faith. The Islamization of science is intended to provide a positive response to the reality of modern science which is secularistic and Islam which is too religious, in a whole and integral new knowledge model without any separation between them.

And as for scholars who have had an impact in the world of science, including Ibn Nafis History also records Al-Nafis as the first doctor to explain the concept of metabolism, then Ibn Sina Ibn Sina's concepts regarding disease outbreaks were brought further by Ibn Baytar from Andalusia, an expert The greatest Muslim botanist and pharmacologist, He wrote in it as many as 1,400 kinds of medicines. Al-Zahrawi Dunia is currently awarding him the "Father of Modern Surgery". Ibn Nais Some writers and historians believe that Ibn al-Nais actually discovered the circulation of blood. Ibn al-Haytham earned the nickname "Father of Modern Optics". Al-Farghani continued in the science of astronomy. He successfully completed research to determine the diameter of the earth and the distance between the earth and other planets. Jabir Ibn Hayyan Some of Jabir Ibn Hayyan's discoveries include: hydrochloric acid, nitric acid, citric acid, acetic acid, distillation techniques and crystallization techniques. He also invented the aqua regia solution (by combining hydrochloric acid and nitric acid) to dissolve gold.

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