



Science, Methods in Science, and Contributions of Muslim Scientists to the Development of Science: Analysis of Nidhal Guessoum's Thought

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Abstract: This study aims to find out how information literacy which is part of library science becomes an ability to understand the integration between science and Islam and its implementation in life. This type of research is descriptive with literature review data sources. Meanwhile, this literature review was carried out in four stages consisting of: (a) focusing on the problem to be studied; (b) connecting literature with problems in a balanced way; (c) include clear research statements based on the methodology in the literature; and (d) critically analyze and evaluate the literature reviewed based on the research discussion. Based on the results of a study of religion and science in a book by Nidhal Guessoum, it shows that Nidhal Guessoum chose at least 4 Muslim scientists to be the main characters, namely Seyyed Hoessin Nasr, Ziauddin Sardar, Abdussalam and al Faruqi, who classify each other as dialectics in chapters 3 and 4 Considering that the philosophy and theoretical foundations as well as the formulas used by science are sourced from the Qur'an and Hadith, it is concluded that science is not contrary to Islam.

Keywords: Islam; Nidhal Guessoum; Qur'an and Hadith; Science

Introduction

Science and technology are the main elements in the advancement of human civilization towards the formation of a knowledge-based society (Solikhudin, 2016; Watini et al., 2021). Science and religion are considered two different things but are needed by humans (Hidayatullah, 2019; Ja'far as-Shodiq, 2020; Meliani et al., 2021). Until now the debate on religion and science seems to never end along with the increasing human need for progress (Fikri, 2020).

Religion and science are important parts of human life (Kurniawan, 2020). Science and religion are two entities that have colored the history of human life (Abdullah, 2020; Maulana, 2022). Both have played an important role in building civilization. With the existence of religion, it has not only made humanity have faith, but also awakened ethical, moral and civilized humans who are the way of life for humans (Lesmana et al., 2018; Multahada, 2021). While science with its development has made world progress with

various brilliant discoveries. From its origins, there is indeed a difference between religion and science (Meliani et al., 2021).

The discourse on the relationship between religion and science has always been an interesting discourse. Science in human life is always developing and changing (Junaedi, 2017). Meanwhile, religion is always considered a hereditary tradition that is maintained by certain communities (Meliani et al., 2021). Science and technology are currently achieving very rapid development, even as if it had never been predicted before. Science and technology in the West such as steam engines, computers, mechanics, and others experienced rapid development in the 17-18 centuries (Pribadi et al., 2020). Since the scientific revolution against religious authority in the 12-13 centuries. It was from then on that science separated itself from Christian religious authority. Although some of science continues to develop with Christianity (Najili et al., 2022).

Most of the countries that currently contribute greatly to science and technology are Western countries

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(Fadilah, 2019). This has become an empirical fact, from a research and academic point of view, public facilities belonging to the community, public order, and others always impress outsiders who visit the place (Taqiyuddin, 2021). The development of science is also followed by the development of the existing human paradigm (Sabila, 2019). The development of science and technology is not without problems (Rusdiana, 2014). Many in-depth studies regarding the long-term impact of the rapid development of this science (Wiyono, 2020).

Based on this explanation, it is necessary to study in depth the relationship between science and science. In this article the author will try to review the study of religion and science in a book by Nidhal Guessoum.

Method

This type of research is descriptive with literature review data sources. The author collects information from several literary sources, namely books, journals, and others. The writing starts with the writer reading a book, journal, or something else and then takes a number of important points and then describes them through his understanding. After being read, then understood, then analyzed, the writer gets a conclusion that can be drawn. This literature review study was carried out in four stages consisting of: (a) focusing on the problem to be studied; (b) connecting literature with problems in a balanced manner; (c) include clear research statements based on the methodology in the literature; and (d) critically analyze and evaluate the literature reviewed based on the research discussion.

Result and Discussion

In this paper the author tries to review the study of religion and science in the book by Nidhal Guessoum "Islam's Quantum Question reconciling Muslim tradition and modern science", focusing on chapters 3 and chapter 4. As for chapter 3, it discusses "Science and Some Criticisms", while on chapter 4 discusses "Is it possible for Islamic Science to be developed".

Science and Some Criticism

Guessoum started by writing about himself and the dilemmas he faced in lecture halls and in public spaces when giving material on the scientific method and its outputs to the public. The dilemma he refers to is how to simplify the description of science that he conveys so that it is easy to understand.

Guessoum, in this chapter discusses the status of science with its various processes and methods adopted by most of the scientific community. As well as explaining the various perspectives of critics who play a significant role in undermining the great edifice of science with their valid and invalid arguments. For this

reason, he opens the discussion in this chapter by providing an overview of the basics of the scientific process, starting with the question "what is science?" and "how does science work?" It is clear how great Guessoum's desire is for people to understand science, and to be able to distinguish between science, philosophy, art, politics, and religion. It is also clear how disturbed he is by the conditions in which scientists, educators and communicators have not succeeded in doing so.

Answering Questions About "What is Science?"

Samir Okasha in his short treatise entitled *Philosophy of science*, where he wrote "Surely science is just the attempt to understand, explain, and predict the world we live in?" in other words science is an attempt to make objective explanations, as well as an attempt to describe the world as wide as possible, and remembering that science is built by humans, the possibility of error or bias is always there.

Ziauddin Sardar stated that "Science is an organized, systematic and disciplined mode of inquiry based on experimentation and empiricism that produces repeatable and applicable results universally, across all cultures". According to Guessoum (2011), this definition is more appropriate, bearing in mind that the emphasis on objectivity, testability and science goals is limited to the category of natural sciences. The main and most important characteristics of science lie in the methods and processes built within it: The scientific method and the noble aspects of science, namely a series of actions: (a) observing phenomena; (b) make a hypothesis; (c) test the hypothesis that leads to specific consequences, then check whether the hypothesis is correct; and (d) repairing or perfecting the hypothesis until the predictions made are proven correct or discarding the results of the old hypothesis and replacing it with a new hypothesis if it contradicts the results of experiments and observations.

When did "Science" Really Begin?

Okasha in *Philosophy of science*: that scientific investigations have started since ancient and medieval times. Dominated by Aristotle's thought, and continued in the era of Galileo.

Sardar in his book *Muslim and the philosophy of science* says that the Muslim ummah has developed a spirit of modern science by emphasizing the repeated calls as contained in the Qur'an for humans to observe and contemplate natural phenomena as a way to know Allah and the decrees-His. The scientific method was first developed by classical Muslim scientists such as Ibn Haitam, al-Biruni and Ibn Sina as the foundation for scientific enthusiasm in the Islamic world. He stated more emphatically in his article entitled "science wars: a Postcolonial Reading", that it was from the Muslim

community in Europe that they learned how to do logical reasoning, get to know experimental methods, discover medical ideas and rediscover Greek philosophy. Most of the components of al Jabar, geometry, basic trigonometry, spherical astronomy, mechanics, optics, chemistry and biology as the most important foundation of the European scientific renaissance came from Islam.

Mehdi Golshani quotes Briffault's statement, that what is called science today which is developing in Europe as a result of the modern world view in the form of observation and experiment methodology in the form of sophisticated mathematical laws is not from Greece, but was transferred to Europe by the Arabs, so that modern science should be considered as the main contribution of Islamic civilization. Abdekader Bachta, found that several aspects of the modern scientific method can be found in the works of ibn Haitam, Al-Biruni, Ibn Rushd, Al-Kindi and Al-Farabi.

Concluding some of these views, Guessoum expressed his opinion that science is a set of methods, systematic, objective, quantitative and falsifiable, enabling people to observe the universe. Several civilizations, particularly Islam, have introduced and implemented some of these traits, although it is unclear whether earlier societies developed the understanding we have of science today.

A Very Basic Overview of the Philosophy of Science

Guessoum cites scientists such as Roger Bacon, a 13th century British philosopher who had developed experimental and empirical methods, William Herschel, an 18th century scientist who began to emphasize imagination or creativity in building models and theories and the three 20th century philosophers of science, namely Karl Popper, who succeeded in introducing the characteristics of scientific hypotheses and aspects that distinguish between science and non-science which are popularly known as the falsificative method, Thomas Kuhn in his book "the structure of scientific revolution" focuses on how a paradigm replaced by another paradigm (for example the Geocentric cosmological paradigm was replaced by the Heliocentric paradigm, and Newton's theory of gravity was replaced by Einstein's theory). The last scientist of the 20th century who was called Guessoum was Paul Feyerabend who was later very famous for his theory "anything goes" (anything goes) where he stated that there is no single approach in finding knowledge that must be standardized in the scientific method, there is no boundary that separates scientific and unscientific activities, both in methodology and content.

Science Postmodernism

The era of scientific postmodernism lasted from 1960 to 1970, was recognized by the emergence of social

movements which made sharp criticisms of science, including the flow of Environmentalism which criticized the dangerous application of science and its methods. The dangers posed by this science mean for the environment, such as the use of pesticides, DDT and the like, as Rachel Carson wrote in 1962. In 1979 Jerry Ravetz revealed about the industrialization of science: (a) entrepreneurial science; (b) careless science; (c) science which is dangerous; (d) dirty science. Furthermore, he reveals the "structural contradictions" namely global pollution and climate change, knowledge and power, knowledge vs ignorance, elitism vs democracy: corrupt practices in research; image and audience, social context and reality, violence vs security, and others.

Ravetz's collaborator from the Islamic world is Ziauddin Sardar. He touched on water and air pollution, acid rain, deforestation, damage to biological life and extinction of species, toxic chemicals, nuclear waste, the spread of cancer, global warming. Sardar reveals how scientists work in the military environment and make science a dangerous weapon. Likewise, the use of humans as research trial objects, for him, cannot be tolerated. Ashis Nandi calls this condition a theology of violence; to the subject, object, benefits, even to the knowledge itself.

The most recent critique of science is the critique of cultural centrism, in which science is seen as rooted in Western norms, rules and methods. This idea was introduced and developed for the first time by Seyyed Hoessen Nasr who emphasized that the definition of science and the conception of the world and the universe is actually very closely related to the cultural and metaphysical principles of the community in which science is developed.

Metaphysical Fundamentals of Science

The word metaphysics gives rise to the association of ideas "out of this world", spirit, mysticism, and anything that is outside nature. However, when viewed from the definition according to the dictionary, then metaphysics is defined as the theoretical principles that underlie an object or field of inquiry. Then what is meant by the foundations of metaphysics are the basic principles or accepted doctrines about how science, philosophy, or fields of knowledge are built. Derived from this, the metaphysical foundations chosen as the basis of science become clear, whether the type is materialistic, theistic or Islamic.

Kitty Ferguson gave concise points that 17th century scientists agreed on in this regard: (a) The universe is rational, evidence of the intelligence and loyalty of its creator; (b) The universe can be understood by humans; (c) The universe has contingencies; (d) There are things which are objective reality; (e) There is unity in the universe.

Mehdi Golshani quotes the expression of Abu al A'la al Maududi (20th century Pakistani scientist: 1903-1979) Science operates in two fields: First, it consists of facts related to the universe or reality. Second, it discusses the activities that people do when building a theoretical framework from these facts and constructing certain concepts.

Scientific Imperialism (Scientism)

Scientism is a school that aims to expand the application of science to all things in the universe, including human life and society. So it appears that the scope of science includes all subjects and the universe. So that it has an impact on the notion that Scientism seems pejorative so that the conceptual program is often called "scientific imperialism" and "Arrogance Ideology".

Theistic Science

"Say" pay attention to what is in the heavens and on earth, but the signs of Allah and the warnings of His messengers are of no benefit to those who do not believe" (QS.Yunus: 101).

Mehdi Golshani, Iranian Physicist and Philosopher cites this verse to base his thought that humans must

return God to a worldview and scientific approach. This is what is called "Theistic Science".

To answer whether theistic science is a combination of Philosophy and Scientific Methodology, one must pay attention to the following points: Theism (the opposite of Deism) is religion as the creator, designer, sustainer of the universe, so that without Him the existence of the universe would be impossible. Regarding this theistic science, Alexander says that Theism is a model that seems more in line with the properties of the world we observe.

Is it Possible for Islamic Science to be Developed?

Guessoum started by proposing two opposing camps namely al-Gazali, Ibnu Taimiyyah, Anwar al Jundi and Ibn Khaldun on the camp against non-religious science, and scientist Farouq Ahmad al-Dasouqi on scientists who support Islam and science. The opinions of the pros and cons of Islam and Science are shown in table 1.

Guessoum discussed the dialectics of science and religion by presenting 4 main figures, namely Seyyed Hoessin Nasr, Ziauddin Sardar, Abdussalam and al Faruqi, who classify one another. The classification of scientists' thoughts according to these figures is shown in table 2.

Table 1. Opinions of Pro and Contra Islam and Science

Opponents of Non-Religious Science	Argument
Al-Gazali	"Natural sciences are a mixture of truth and lies, when someone has entered into it then he will surely defeat his religion"
Ibnu Taimiyyah	"Only knowledge inherited from the prophet deserves to be called knowledge, while other things are not beneficial"
Anwar al-Jundi	"Western science actually grows out of a misleading arrogance, because it denies the creator of life and the universe, and replaces God with nature"
Ibnu Khaldun	"Natural sciences are irrelevant for religion and life, for that natural sciences must be abandoned"
Supporters of Science and Religion	Argument
Farouq Ahmad al Dasouqi	"If science is knowledge that is based on evidence and leads to certainty, then Islamic religious sciences are the same, so if someone says that religious knowledge is science, then that person is not abusing the truth or being exposed to religious bias"

Table 2. Classification of Scientific Thinking

Figure	Thinking	Thought Criticism
Seyyed Hoessen Nasr	Perennial Science Philosophy: <ul style="list-style-type: none"> • Existence is singular. • There are two realities or existences: the physical world which is sensed and the spiritual world which is inaccessible to reason and senses, can only be reached through other means such as tarekat. • Man is a prime example of the existence of two distinct but inseparable realities. • Humans can use their intellectual and spiritual dimensions to seek the truth. This group divides knowledge into 2: (a) Knowledge that is absolute/Qat'I, comes from Allah contained in the Qur'an; (b) Science that is assumption/dzanni, which is obtained by rational methods. This group explores how to acquire knowledge:	Ziauddin Sardar: <ul style="list-style-type: none"> • Islamic Science Nasr worships the hidden symbolism of science. • Efforts to return non-scientific branches of knowledge show a mix-up between the fields of Sufism and religious philosophy. • Nasr and his group are categorized as Gnosticism

Figure	Thinking	Thought Criticism
Al Faruqi	<ul style="list-style-type: none"> • Through an intuitive perspective (believing that Islamic science comes from divine intelligence, not human reason). • Scientia sacra (believing that knowledge is at the heart of every revelation and at the center of the circle that encompasses and characterizes tradition. <p>Islamization of Knowledge, aims:</p> <ul style="list-style-type: none"> • To build a contemporary Muslim epistemological system, especially those derived from the Qur'an. • To create methods related to the Qur'an and Hadith as a source of knowledge, thought and civilization. • To create Methods related to Islamic classical heritage • To develop methods related to modern heritage in order to build interaction with global modern thinking and civilization to overcome various crises. 	<p>Ziauddin Sardar:</p> <ul style="list-style-type: none"> • The Islamization of science will have an impact on the elimination and filtering of science that is considered non-Islamic (dichotomy). • Islamization of science is a plan that is very difficult to realize, although not impossible
Ziauddin Sardar	<p>Ijmali School (Islamic Science): Based on two basic ideas:</p> <ul style="list-style-type: none"> • Modern Science is flawed and dangerous, both in its metaphysical basis and in its technological applications. • Islam encourages the pursuit and pursuit of science by considering ethics, moral values and harmony between humans and the universe. <p>This group (Munawar Anees) presented 10 points that should not exist in Islamic science: (a) Islamization of Science; (b) Reductive; (c) Anachronistic; (d) Dominant in Methodology; (e) Fragmented; (f) Unfair; (g) Narrow; (h) Not Socially Relevant; (i) Bucaillistic; (j) Of a cult nature.</p> <p>The scientific framework of the Ijmali school: (a) Tauhid; (b) the Caliphate; (c) Worship; (d) Science; (e) Halal vs haram; (f) Fair vs tyrannical; (g) Istislah vs dhiya'</p>	<p>Pervez hoodboy: "If the reader wants more than platitudes, he will be disappointed." He conveyed this expression to satirize how impossible the ideals conveyed by Sardar were.</p> <p>Adam Wishart: "Most of the progress in cancer research was achieved by relying on animal trials, so when there is anti-surgery, it will cause this cancer research to slow down"</p> <p>Andrew Jamison: "Islamic science programs appear to be improving rhetorically, but losing track of their practical accomplishments and focus"</p>
Muhammad Abdussalam and Pervez Hoodboy	<p>Science is objective and universal: Civilization-forming sources:</p> <ul style="list-style-type: none"> • the Koran • The spirit of studying • Rational Reflection <p>Views:</p> <ul style="list-style-type: none"> • There is no need for confrontation or efforts to harmonize between Islam and science, because science itself is very compatible with Islam. • Regardless of the choice of different scientific disciplines and societies (Japanese, Chinese, Indian, Oriental, etc.), the laws, traditions and methods of science remain universal. • Medieval scientists such as al KIndi, al Farabi, Ibn Haitam, Ibn Sina, never debated between science and religion, even though they were Muslims. • "Wisdom is a treasury that believers seek, therefore, wherever it is found, believers are entitled to it" (al-Hadith). 	<p>Ziauddin Sardar:</p> <ul style="list-style-type: none"> • Salam and his followers are lonely people (without a guide). • Salam and his followers are conventional positivists (a worldview in understanding the world based on science. Adherents of positivism believe that there is little difference (if any) between social science and natural science, because society and social life work based on rules, so is nature/reality)

Methods in Studying Science

It is necessary to classify knowledge by determining its status and ontological basis, because it is the basis for an epistemology, and has an impact on the choice of methodology. This difference can be seen in modern or Western epistemology which is based on the status of materialistic ontology and rejects the existence

of metaphysical reality (ontology) and only focuses on physical objects. Very different from the epistemology that has been proclaimed by Muslim philosophers who have been abandoned by the majority of Muslims themselves where Islamic science is not only based on the ontological status of material nature (physical objects) but more than that it also stipulates that in

addition to the ontological status of material nature there are also natural ontological objects eg (mathematical objects) and natural ontological objects (metaphysical objects).

Based on this scientific classification, Islamic science offers several scientific methodologies according to its ontological status, namely; intuition and unification of the soul (the Irfan method), to know pure non-material objects or metaphysical objects in a direct way, rational deduction to know metaphysical objects indirectly as well as mathematical objects and Induction (observation and experiment) to know objects -object physics. I can describe the levels in this scientific classification in the following diagram.

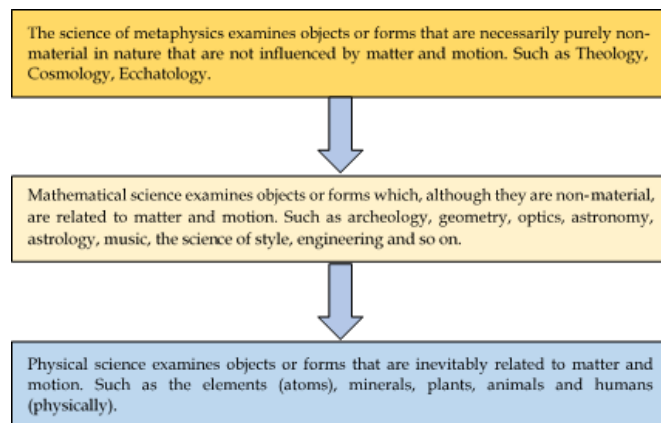


Figure 1. Levels in scientific classification

Conclusion

Science and technology are the main elements in the advancement of human civilization towards the formation of a knowledge-based society. Science and religion are considered to be two different things but are needed by humans, until now the debate on religion and science seems to never end along with the increasing human need for progress. Considering that the philosophy and theoretical foundations and formulas used by science are sourced from the Qur'an and Hadith, it is concluded that science is not against Islam. Based on the results of a book review by Nidhal Guessoum (chapters 3 and 4) it shows that Nidhal Guessoum chose at least 4 Muslim scientists to be the main characters, namely Seyyed Hoessin Nasr, Ziauddin Sardar, Abdussalam and al Faruqi, who classify each other as dialectics in chapter 3 and 4.

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