

## Values in Islamic Science

**Roziyah Sidik @ Mat Sidek and Rozita Mustapha**  
Department of Arabic Studies and Islamic Civilization  
Faculty of Islamic Studies  
University Kebangsaan Malaysia  
43600 UKM Bangi, Selangor, Malaysia

### Abstract

*This research begins from Einstein's statement that "science without religion is lame, religion without science is blind". This view clearly depicts science as being not value-free or, in other words, science is bound to values. Thus, the purpose of this research is to submit proof that the above statement is true. The research objective is to analyse values implicit in Islamic science. This is a qualitative research based on historical study and content analysis. Historical study method is chosen for its suitability in the study of past occurrences. Document analysis involves documents obtained from primary and secondary sources. Data is collected by textual method, which is chosen to enable the researcher to explain and make her own interpretations of information from referred sources. Data is analysed using descriptive approach. Research results find that the values contained in science are religious values, cultural values and universal values*

**Keywords:** Values, Islamic science, Culture, Universal

### 1. What Are Values?

Basically, there has been much discussion on the definition of values. In the West itself, there have been discussions on the relationship between values and science and technology since the 19th Century until the present (Osman 1997).

Kluckhohn (1951) explained that value is an expressly or impliedly desired conception that characterises an individual or group as influencing the ways, purpose and goal of action taken. However, psychologically, he defines value as a motivational aspect which refers to a personal or cultural status, that is, a value does not come about dramatically. This definition stresses that the value factor applies to an action and acts as control over the direction of the action. Redfield (1953) defines values as an express or implied concept of an individual or group characteristics desired to influence choice of mode, purpose and all actions. For example, the Malay society uses *pantun* which has implied meanings in conveying a value or lesson regarding a matter. This is one of the traditional values developed among the Malay society since ages ago. Traditional values which are deeply entrenched form a system of values which shape the beliefs, norms, practices and action of members of a society. These traditional values formed down the generations cover ideas, practices and knowledge.

A value also absorbs all aspects of life, all goals set by an individual as very important matters in life. Such is the view expressed by Super (1957) on the definition of value. Raymond Firth (1961) however explained that values are identified through objects, motives and goals. William A. Scott (1965) equates values with ideal morals. He defined values as an individual concept regarding an ideal communication used to evaluate bad or good and a wrong or truth regarding the communication actually seen or felt. This is because a value is an expression of person's own awareness. However, this statement may not be accurate because of shallow thinking and limited intellectual capacity. A value not only gives a goal of concrete actions but is also acts as nominal value for choosing a goal.

For Coughlan (1969), values are usually seen as priority, criteria, object, possession, personality and status characteristics, fixed mindset passed down in objects or found in humans with similar behaviour. And Hutcheon (1972), an anthropologist defined values as norms, cultural idealism, beliefs, valuables, value orientation, good behaviour and attitude.

In addition, another anthropologist, Jules Henry (1963) defined values as something considered good such as love and affection, good-heartedness, satisfaction, enjoyment, honesty, politeness, serenity and simplicity. While Rath, Harminand Simon (1980) defined values as broad guidelines of behaviour which give direction in the life of a person or member of society.

From the views above, it is clear that values are influenced by many factors or aspects, such as time, age, cost, place, needs, situation, environment, goals and purposes. Humans are entitled to put a specific value depending on particular needs, importance and purposes. For example, a thing which looks like an umbrella is very useful for the purpose of protecting the body from rain or sun. If it is not associated with personal needs, an umbrella would be worthless. Likewise, Malay *pantun* (poems) was traditionally used in the past to give advice in a subtle way in or to be sarcastic. However, today *pantun* is considered as literary work of high esthetical value even though some may think otherwise. For this reason, upon deeper review, values constitute a broad term and have an inseparable relationship with humans and environmental situation. This view was expressed by A. R. Seetha Ram (2007) in his writing, *Values: What and Why*. Values are associated with something invaluable and meaningful to certain parties according to value considerations. Values are also inspirations influenced by emotions, needs and purposes which will drive humans to do anything in order to achieve their purpose. Values are not based merely on beliefs, but have other dimensions such as emotions. Values show emotional commitment which may influence, for example, how a person shows likes and dislikes towards something. Such a situation is analogous to liking someone because of the value of like emotion or disliking someone due to the value influence of the hatred emotion. This clearly shows that what is meant by “good values” is relative to particular needs. Conversely, if unsuited to particular needs or use, such values are said to be bad.

In order to understand the use of the values concept in this research, the researcher agrees with the view of William A. Scott (1965) who defined values as an individual concept regarding an ideal communication to assess badness or goodness. However, the value judgment requires to be linked with reason and revelation (religious) because a society which is synonymous with religion would implement good or moral values in life. The objective of implementing such values is so that recommended moral values and positive attitude to life and work may be practiced to improve human standard of living and achieve optimum results based on given resources.

In summary, values are an important aspect which shapes the culture of human life. Values also reflect social norms which control human or social group behaviour. Without rules and taboos, an individual member of society may do as he wishes without thinking of social perceptions or the views of people around him. Values are inherited, maintained and well-preserved. Yet there are values, which though once held, have lapsed, are changing and will change. Thus, implementation of values based on norms established from time to time needs to go hand in hand with the building of a harmonious and unified society.

## **2. Religious Values In Islamic Science**

Islamic science is required to pivot on the Islamic religion. The relation between religious values and science has been widely discussed by many scholars. Einstein (1930; 1939; 1941; 1948) expressed his view that “science without religion is lame, religion without science is blind”. Azizan Baharuddin (1995; 2006) explained her view that there exists a harmonious and even complementary interaction between science and religion. Endang (1982) in his research, *Sains, Falsafah dan Agama* (Science, Philosophy and Religion), discussed the relationship which exists due to the sharing of nature as object of study.

Kettani (1984) proved that religion is very closely related to science and technology. And Azizan (1995) explained that there exists a very close relationship between science and religion. In another research, Azizan (2003; 2006) discussed religious values found in science. She explained that these religious values relate harmoniously with religion and are not separate from it. The views submitted above prove that the relationship between science and religion is already recognised by many parties. Religious values in the context of Islamic science may be proven through the writings of renowned chemists such as Jabir Ibn Hayyan and al-‘Iraqi who associated religious values with science. Their writings focused on (alchemy) experiments to convert base metals into gold which has pure and stable characteristics or to create a universal elixir. What is stressed here is that the field of alchemy, the forerunner of chemistry, focused on spiritual enhancement and transforming the lower self to a higher complete self.

Ahmad Fauzi (1985) commenting on this matter revealed that the soul or psyche, which goes through a spiritual chemical process with the presence of a spiritual agent such as religion, may be released from physical shackles in order to transform into something pure. If a material or metal involves going through chemical dissociation and distillation for physical transformation, then likewise, spiritual transformation from a lower self to a higher more complete self goes through a similar spiritual chemical process. In chemistry, both physical and spiritual chemistry are interrelated. For example, humans meditate to ponder about creation and its physical process and this affects their psyche or souls.

Religious values in science also create motivation leading to development in other fields of science. The development of astronomy, for example, is linked to religion as it came from the desire of the Muslim society to determine the beginning of *Ramadan* (fasting month), the *Eid* festivals, the day of *Wuquf* (Stay at Mount Arafat), prayer times and direction of *Qiblat*. Society's needs and desires motivated scholars to conduct research ultimately for the benefit of society. Thus, astronomy thrived due to motivation from religious values which necessitated research in this field.

In other fields such as mathematics, its development due to the society's desire to implement *muamalah* (Islamic civil and commercial transactions), *faraid* (distribution of inheritance) and *zakat* (obligatory charity) led scholars to conduct research. Al-Khawarizmi, for example, had studied and examined the Greek mathematical work, *Elements* by Euclid (Boys-Stones 2007). As a result, al-Khawarizmi had found Euclid's mathematical concept based on numbers, that is, all mathematical operations are number-related (Shaharir and Abdul Latif 1989). Al-Khawarizmi also found inspiration from this discovery and introduced a new mathematical concept known as algebra. Algebra is a number-free mathematical concept detailed in his famous work, *Kitab al-Jabr wa al-Muqabalah*. This work is no mean feat for without his discovery of algebra, the set theory, advanced geometry, calculus (calculation by using algebraic symbols) (*Kamus Dewan* 2007) and others would not be easily discovered and developed. In al-Khawarizmi's algebra, mathematical thinking shifted from searching for natural order to harmony and justice without marginalising the natural order aspect as well as from ideal mathematics to real mathematics. It means a shift from symbols which became increasingly less representative to reality which means problem-solving of contemporary issues. Thus, algebra emerged to resolve the Muslim society's crisis on distribution of *fara'id* (inheritance), *zakat* (obligatory charity) and so on.

Another field which may be associated with religious development is the field of medicine which developed to meet the survival needs of the Muslim society in the treatment of diseases. The main purpose of human creation is to perform *ibadah* (worship) to Allah SWT. This is asserted by Allah SWT in verse 56 surah al-Dhariyat which means: "I have only created jinns and men, that they may serve Me". A Muslim will be able to perform *ibadah* if he has the capability to do so. For example, a Muslim in a state of good health would be able to perform *ibadah* to Allah SWT. The better his state of health, the more optimum his *ibadah* performance would be. The steps to optimise his state of health lie within the field of medicine. One relevant example is proper treatment for a health disorder. Hence, the demand for developing research in the field of medicine. Moreover, Islam encourages prevention of disease as a priority over giving treatment for ill-health. Thus prevention of disease also encourages excellent research in the field of medicine. Studies by Hamarneh and Sonnedecker (1963) on al-Zahrawi's work, *al-Tasrif li Man 'Ajiza 'an al-Ta'lif*, for example, relates to healthcare through proper diet. In his 26th article, al-Zahrawi proposed a nutritious diet for healthcare, not merely tasty food. Nevertheless, he agreed that a delicious and nutritious diet is good for health.

Consistency between religious values and scientific development proves that there is no conflict between Islam and science. However, a conflict may arise when science and its methods are made to be all-inclusive, sacrificing other values in Islam. This is asserted by M. Husain Sadr (1984) in his work, *Science and Islam: Is there a conflict*, in relating the Islamic concept to seek knowledge as a means to understand God and resolve social problems. Therefore, scientific exploration and research are not purely for science, but a means to understand the signs of creation and Omnipotence of Allah SWT. It is these same religious values which have elevated Islamic science in the golden age from the 9<sup>th</sup> to 13<sup>th</sup> Centuries CE (Nasr 1976; Rosnani 2010). In fact, Sarton (1927) in his work, *Introduction to the History of Science*, regarded those centuries as Islamic centuries by listing numerous renowned Muslim scientists. Islamic science developed in line with religious values towards Allah SWT. In contrast, secular science depends solely on the use of reason and rationale to seek truth. From the tawhidic concept in religion was born the unity of knowledge concept in epistemological philosophy and the concept of causality, for example, in the process of nature's creation (Sardar 1992).

Therefore, discussion on science cannot be separated from al-Qur'an and al-Sunnah. In fact, the relationship between science and religion became the catalyst to development of Islamic science. This was the unique contribution of past Muslim scientists based on theology and *rabbaniyyah* (devout godliness) ethics. Nasr (1984) acknowledged this in asserting that the source of the catalyst for the Muslim civilization was derived from the strength of Islamic teachings based on al-Qur'an and al-Sunnah and that science developed parallel to Islamic development, not in contradiction to Islamic principles and methods.

In addition, science is also a means or tool to seek the pleasure of Allah SWT. Mohd Yusoff (2009) gave his rational view that in the issue of "religion without science is lame". He argued that almost all the commandments and obligations cannot be implemented and completed if science and technology were not developed. Apparel to clothe the body, clean water for ablution (*wudhu'*), convenience of transportation to perform *hajj*, direction of *Qiblat* to pray, all of these are not possible or convenient without science and technology. In other words, the practice of religion would be lame if religion were developed while marginalising and denying the role of science and technology. Islam is a religion which encompasses every aspect in life. Thus, in order to fulfil each aspect to achieve well-being in life, mankind needs modern science and technology.

Islamic scholars have proven the importance of inserting religious values in science. Ibn Sina, for example, wrote medical books which rested much on spiritual elements such as his writing on vital force and its functions. He said: "Allah made the left ventricle of the heart to function as storage for the vital force and also the source of its issue" (Nasr 1970). His theory of the human anatomy and physiology, contained in his book, *al-Qanun fi al-Tibb*, was the first ever complete in form. In it he arrived at the conclusion that "each part of the human body from the tip of the hair to the tip of the nails are interconnected and interdependent". He also stated that "physical health and mental health are mutually supportive of each other". Every individual should note this important matter because it is a gift from Allah SWT.

Therefore, insertion of religious element in writings and research is very essential for Muslim scientists. These values will make the writer and reader mutually appreciate all the contents in the writings. Besides the benefit of knowledge acquired in the writings, it also raises the reader's awareness of the greatness of Allah SWT as the Creator. Awareness of the religious element inserted causes strengthening of faith in them. It thus leads them to do research on God's creations as the means of seeking Allah's pleasure as well as self-submission to Him. This situation is affirmed by Sardar (1992) in stating that the uniqueness of Islamic science may also be seen in the placing of science as a tool to seek the pleasure of Allah SWT, a form of worship which has spiritual and social functions.

### 3. Cultural Values In Islamic Science

The English word 'culture' is taken from the Latin term '*colere*' which means to tend or cultivate (history1978.files.wordpress.com). According to *Kamus Dewan* (2007) culture is civilization, advanced thinking, reason or intellect (way of thinking, behaviour and so on). Culture is another type of values found in science, in both Western as well as Islamic science. The issue of cultural influence on science is really not something new. The earliest scholar who raised this issue was Spengler (1932) in his work, *The Decline of the West*. In this context, he raised the issue of culture in the concept of numbers. Shaharir and Abdul Latif Samian (1989) held views in line with Spengler's idea. Both of these local scholars touched on a group's cultural influence on mathematics. Shaharir (1990) in a lecture, *Syarahana Perdana Jawatan Profesor Universiti Kebangsaan Malaysia*, also discussed the symbiosis between culture and mathematical science which occurs from time to time.

In some other articles, Shaharir also discussed cultural influence on mathematics. One of these articles was "*Kritikan awal kepadapremisil musainstabi'i*" (Early Criticism of Natural Science Premises) (1991). In addition, Sardar (1992) also submitted a similar view when he argues that science and technology policy ought to reflect the culture of a race. The relationship between science and culture was also stated by Glyn Ford in his article, "Rebirth of Islamic Science" (1984). Shaharir once again voiced the same matter in another article, "*Pengaruh budaya keatasmatematik*" (Cultural Influence on Mathematics) (1992). Sardar (1992) in another of his writings also linked the close relationships between Chinese and Islamic sciences with their respective cultures. In the year 1998, Shaharir was seen as repeating his stand on this matter. If before this, his statement involved mathematics; his writing this time was more general when he discussed the relationship between science and culture in his article, "Towards a Quantum Leap in the Development of Islamic Science in Malaysia" (1998).

And in his book, *Pengenalan Sejarah dan Falsafah Sains* (Introduction to History and Philosophy of Science) (2000), he submitted the continuation to the emergent view on science being culture-bound. Other than Shaharir and Abdul Latif, scholars such as Azizan (2003) also shared the view that culture has an influence on science in his article, “*Kesanglobalisasiterhadapbudayasetempat*” (The Effect of Globalization on Local Culture). The views submitted above prove that there is a relationship between science and culture already acknowledged by many parties. Cultural values in Islamic science may be proven through collaboration forged between Muslim and non-Muslim scientists in developing science. The collaboration which occurred reflected the social culture in the Muslim civilization which could set aside religious sentiments and made the desire for scientific development the priority.

Abu ‘Abd Allah Muhammad ibn Ibrahim al-Fazari, Abu Sahl al-Fadl ibn Nawbakht and Abu ‘Uthman Sa‘id ibn Ya‘qub al-Dimishqi were some of the scholars representing Muslim scientists. Some scholars who represented the non-Muslim scientists were Hunayn ibn Ishaq, Salmawayh ibn Bunan, ‘Abd al-Masih Na‘ima and Jurjis ibn Jibra‘il ibn Bakhtiyashu’ (Nasr, 1984). The focus here is more on the root cause for the collaboration regardless of religious background. The participation of non-Muslim scientists shows that religion is not a hindrance at all to being jointly involved in developing Islamic science (Roziyah 2006). Even though they did not profess the Islamic religion, they were encouraged and were willing to contribute their energy and expertise together with their Muslim counterparts to develop Islamic science based on Islamic religious values. This is the reason many sources prefer to use the term Arab scientists rather than Muslim scientists in referring to this group. Another cultural value to be noted is related to the attitude or mentality of not restricting development of civilization to just the Muslim civilization. In other words, no one civilization may develop on its own without influences or contributions from other civilizations. The concept of mutual influence, giving and receiving as well as exchange of knowledge in the process of scientific development between societies and states has been going on since even the times of Ancient Egypt and Babylon.

The Muslim civilization had received the legacy of past civilizations which it utilized and later developed Islamic science. Islamic science had received the legacies of the Greek, Indian, Persian and also Chinese civilizations. O’Leary (1964) and Roziyah (2009) gave detailed information on how the science of these civilizations was absorbed into Islamic science. The legacy of the Greek civilization was absorbed into Islamic science through two situations. The first situation was when many Greek civilization scientific works were translated into Arabic language and used by the society of the Muslim civilization. The other situation was through dialogue between the Greek and Muslim civilizations in Alexandria. The legacy of the Indian civilization was absorbed into the Muslim civilization in the fields of traditional scientific traditions, specifically, mathematics (including astronomy) and medicine. This absorption occurred in four situations. The first situation was through the Sassanid dynasty in Persia. The second situation was through a number of Indian scholars who were invited to Baghdad and other Islamic intellectual centres. The third situation was through the writings of al-Biruni in the 11<sup>th</sup> Century CE and afterwards.

Finally, the fourth situation was through the activity of translating works from the Indian civilization into Arabic language. The Persian civilization played three roles in the transfer of its legacy to Islamic science. It transferred its own scientific tradition to the Muslim civilization, such as the Persian work, *Royal Astronomical Tables (Zij-I shahriyar)*. It also provided certain aspects of Greek civilization learning translated into Pahlavi and Syriac languages taught to Muslims at centres of learning in Persia such as Jundishapur. The third role was in the transfer of numerous Indian sciences, particularly medicine, astronomy and history to the Muslim civilization. All three roles were undertaken by the Sassanid dynasty. The legacy of the Chinese civilization was absorbed into Islamic science after the Mongol conquest in the year 1258 CE through translation of scientific works into Persian and Arabic languages. However, there was already an earlier relationship between Islamic science and the Chinese civilization through the transfer of Chinese technology to Muslims such as the manufacture of paper. This means that relations between the two civilizations was not limited to trade, overland or by sea, but also covered the intellectual and scientific aspect.

The relationship forged between the above civilizations and Islamic science shows that development in a field of knowledge is not free from the influence of other civilizations. Islamic science did not develop in isolation. Instead, its development was assisted by other civilizations through many ways.

#### 4. Universal Values In Islamic Science

The universal values in this paper refer to two matters. First, universal value refers to the Muslim civilization which did not differentiate among members of society based on religion and race. Second, universal value refers to benefits and goodness obtained from scientific research which the whole mankind is entitled to enjoy. That scholars from diverse racial and religious backgrounds were involved in the development of Islamic science was a clear example of universal values of the first kind, i.e., the Muslim civilization did not differentiate between members of society based on race, language and religion. Jurjis Ibn Jibra'il Ibn Bakhtiyashu', for example, was a Christian Persian scholar who actively participated in developing Islamic science, particularly during the reign of Caliph Abu Ja'far al-Mansur in Baghdad while serving in a hospital at Jundishapur, when he was invited to Baghdad by the Caliph. The Caliph was suffering from dyspepsia due to an indigestion disorder. Ibn Abi Usaybi'ah (1965) and Nasr (1984) recorded that various efforts were taken to treat the Caliph but to no avail. In fact, the Caliph's condition somewhat worsened when treated by doctors of that time. The Caliph was later informed of Jurjis's skill, and thus decided to invite him to Baghdad. Jurjis and some others in his family were engaged in the medical field, and had served not only Caliph Abu Ja'far al-Mansur, but also other Abbasid caliphs such as Caliphs Harun al-Rashid, al-Amin, al-Ma'mun, al-Mu'tasim, al-Wathiq and al-Mutawakkil (Ibn al-Nadim 1997; Roziah and Wan Kamal 2012).

Salmawayh Ibn Bunan, also a Christian scholar, who actively participated in developing Islamic science, particularly during the reign of Caliph al-Ma'mun and Caliph al-Mu'tasim (795-842M). Ibn Abi Usaybi'ah (1965) reported that as soon as Caliph al-Mu'tasim had ascended the throne, he appointed Salmawayh as his personal physician. In addition, Salmawayh also played a role in translating Greek works into Arabic. Sarton (1927) revealed the fact that Salmawayh together with Hunayn Ibn Ishaq translated the work, *Methodus Medendi*. Another Christian scholar who also contributed to the development of Islamic science was Hunayn Ibn Ishaq. His involvement was significantly notable as his name appeared in many translation projects of works from other civilizations into Arabic language. The Greek works translated were *Megale Syntaxis Mathematike*, *Alexandrian Summaries*, *Materia Medica* and also *Methodus Medendi* which involved substantial efforts on the part of Hunayn Ibn Ishaq.

This fact is consistent with a statement by Sarton (1927) which mentions that:

"... out of 8 physicians whom I have selected as the most important, 6 were Christians...of the 2 remaining, 1 was a true Arab, the other a Persian. A great part of the activity of these men was devoted to translating Greek medical texts, especially those of Hippocrates and Galen, into Syriac and into Arabic. All of these translators were Christians, the most prominent being Yahya ibn Batriq, Ibn Sahda, Salmawayh ibn Bunan, Ibn Masawayh and Ayyub al-Ruhawi."

In the context of the second kind of universal value, Islamic science is universal because the whole mankind is entitled to the benefits and goodness obtained from scientific research. This universality is clearly stated by Allah SWT in al-Qur'an which directly prohibits secrecy of knowledge or making it as a commodity for sale and purchase (Sardar 1992). Ibn Hazm (m.d.1064CE) in his writing constantly stressed on the universal characteristic of natural science and this characteristic was probably the factor for Islam's acceptance of other civilizations (Hairudin 2004). Kettani (1991) and Roziah (2006) who placed the issue of universality as one of the characteristics of the Muslim civilization explained that "universality emerged due to the reality that the one and only bond of unity among individuals who were accepted in Islam was the unifying bond of beliefs and purpose in life. All Muslims are bonded to this alliance named *ummah* (community). Bondage in *ummah* never opposed anyone outside of it, and instead, Muslims are always aware that they are part of the *ummah* of the whole mankind. Hence, it is not surprising that Muslim scholars are willing and ready to cooperate with non-Muslim scholars" for the benefit of mankind.

Universal values in Islamic science have to be seen in the context of the purpose of scientific research for the benefit of the whole mankind regardless of race and descent. It is not appropriate to be owned only by a certain group or certain nations. Sardar (1992) recorded that Islamic science, even though similar in being unique as Greek or Chinese science, differs from both in that it was more international due to the geographical spread and cosmopolitan nature of the Muslim civilization. Efforts in developing Islamic science which are in line with values, will give new inspiration to universal man.

Conversely, if science were developed based on certain interest without relating it to humanity and the environment, and considered as value-free, this approach would ultimately cause social, moral, psychological and environmental destruction.

## 5. Conclusion

From the Islamic perspective, science is a form of worship (*ibadah*) and inseparable from religion due to the limitations of the human mind which can neither compare to the knowledge and power of the Almighty Allah SWT nor can it fathom matters which are beyond the frontiers of thinking. If science and religion were separated, there would be lameness in society's well-being. This is proven by scientists of the Muslim civilization who were always trustworthy and concerned in developing science. They acted as responsible vicegerents (*khalifah Allah*) in enriching the face of Allah's earth cutting across cultures and civilizations. The core values in Islamic science proved that science is not value-free, and were able to lead to excellence for pioneers, glory for civilizations and the well-being of the whole of mankind. On the contrary, if scientific development were value-free, it can only lead to conflict between science and religion, and ultimately invite destruction of the social, psychological, moral and environmental systems.

## 6. References

### *al-Qur'an*

- Ahmad Fauzi Mustapha. (1985). Tamadun Islam dalam Bidang Kimia (Muslim Civilization in the Field of Chemistry). In Shaharir bin Mohamad Zain. *Pengenalan Tamadun Islam dalam Sains dan Teknologi*. Kuala Lumpur: Dewan Bahasa dan Pustaka. Pp. 100-124.
- Azizan Hj Baharuddin. (1995). *Science and Belief, Discourses on New Perceptions* Discourse. Kuala Lumpur: Instituti Kajian Dasar.
- Azizan Baharuddin. (2003). Agama dan Sains: Pendekatan Holistik dalam Perspektif Islam (Religion and Science: Holistic Approach in Islamic Perspective). *Malaysian Journal of Science and Technology Studies*. Jil. 1. Pp. 26-49.
- Azizan Baharuddin. (2006). Satu Perspektif Lokal Hubungan Sains dengan Agama (A Local Perspective of Science and Religion Relationship). In Mohd Hazim Shah (Pnyt.). *History, Philosophy and Social Studies of Science: Essays in Honour of Ungku Aziz*. Kuala Lumpur: Penerbit Universiti Malaya. Pp. 19-33.
- Boys-Stones, G. (2007). Physiognomy and Ancient Psychological Theory. In Swain Simon (Ed.). *Seeing the Face, Seeing the Soul: Polemon's Physiognomy from Classical Antiquity to Medieval Islam*. New York: Oxford University Press. Pp. 19-124.
- Coughlan, R. (1969). The Factorial Structure of Teacher Work Values. [*American Educational Research Journal*] Vol:6
- Einstein, A. (1930). *New York Times Magazine*. 9 November.
- Einstein, A. (1939). *Science and Religion I*. Workingpaper Princeton Theological Seminary. 19 Mei.
- Einstein, A. (1941). *Science and Religion II*: Workingpaper Simposium Science, Philosophy and Religion.
- Einstein, A. (1948). Religion and Science: Irreconcilable? In *The Christian Register*. June.
- Endang Saifuddin Anshari (1982). *Sains, Falsafah dan Agama* (Science, Philosophy and Religion) Kuala Lumpur: Dewan Bahasa dan Pustaka.
- Firth, R. (1961). *Elements of Social Organization*. London: Watts.
- Ford, G. (1984). Rebirth of Islamic Science. In Ziauddin Sardar. *The Touch of Midas: Science, Values and Environment in Islam and the West*. London: Manchester University Press Fowler.
- Hairudin Harun. (2004). *Retorik Sains dan Teknologi di Malaysia* (Science and Technology Rhetoric in Malaysia). Kuala Lumpur: Dewan Bahasa dan Pustaka.
- Hamarneh, S.K. dan Sonnedecker, G. (1963). *A Pharmaceutical View of Abulcasis al-Zahrawi in Moorish Spain with Special Reference to the Adhan*. Leiden: E.J.Brill.
- Henry, J. (1963). *Culture Against Man*. New York: Vintage Books.
- history1978.files.wordpress.com. 11.09.2013
- Hutcheon, P.D. (1972). Value Theory: Toward Conceptual Clarification. *The British Journal of Sociology*, xxiii, 2.
- Ibn Abi Usaybi'ah. (1965). *'Uyun al-Anba' fi Tabaqat al-Atibba'*. Beirut: Manshurat Dar Maktabat al-Hayah.
- Ibn al-Nadim. (1997). *al-Fihrist*. Beirut: Dar al-Ma'rifah.

- Kamus Dewan. (2007). Kuala Lumpur: Dewan Bahasa and Pustaka.
- Kettani, A. (1984). Science and Technology in Islam: The Underlying Value System. In Ziauddin Sardar. *The Touch of Midas: Science, Values and Environment in Islam and the West*. London: Manchester University Press.
- Kluckhohn, C. (1951). *An Anthropological Approach to the Study of Value*.
- Mohd Yusoff Othman. (2009). *Sains, Agama dan Masyarakat (Religion and Society)*. Kuala Lumpur: Dewan Bahasa and Pustaka.
- Nasr, S.H. (1970). *Science and Civilization in Islam*. New York: American Library.
- Nasr, S.H. (1984). *Science and Civilization in Islam*. Shah Alam: Dewan Pustaka Fajar.
- O'leary, D.L. (1964). *How Greek Science Passed to the Arabs*. London: Routledge & Kegan Paul Ltd.
- Osman Bakar. (1997). *Peranan Positif Nilai-nilai Islam Dalam Pembangunan Sains Dan Teknologi (Positive Role of Islamic Values in Development of Science and Technology)*. In *Kesturi*, 7 (1). Kuala Lumpur: Universiti Malaya. Pp. 9-12.
- Ram, A.R.S. (2007). *Values: What and Why in Value Education* by N.Venkataiah. New Delhi: APH Publishing Corporation.
- Raths, Harminan Simon. (1980). *Values and Teaching: Working with values in the Classroom*.
- Redfield R, (1953). *The Primitive World and Its Transformations*. New York: Cornell University Press.
- Roziyah Sidik @ Mat Sidek. (2006). Kolaborasi Muslim-Non Muslim: Pemacu Kegemilangan Sains dan Teknologi Era 'Abbasi (Muslim and non-Muslim Collaboration: Catalyst to Scientific and Technological Excellence of the Abbasid Era) In Ezad Azraai Jamsari and Zamri Arifin. *Prosiding Simposium Tamadun Islam Abad Pertengahan: Politik, Ekonomi, Sosial dan intelektual Era 'Abbasi*. UKM Bangi: Kelab Mahasiswa Jabatan Pengajian Arab dan Tamadun Islam (NAHDAH), Yayasan Dakwah Islamiah Malaysia (YADIM) and World Islamic Call Society Kuala Lumpur.
- Roziyah Sidik @ Mat Sidek. (2009). Warisan Tamadun Terdahulu sebagai Sumber Sains Tabi'i dalam Tamadun Islam (Legacies of Past Civilizations as Source of Natural Science in Muslim Civilization). In Azmul Fahimi Kamaruzaman et al. *Proceedings of the Malaysia Conference on Arabic Studies and Islamic Civilization*. Pp. 655-660.
- Roziyah Sidik @ Mat Sidek dan Wan Kamal Mujani. (2012). Muslim and Non-Muslim Collaboration: Catalyst to the Scientific and Technological Excellence of the Abbasid Era. *Advances in Natural and Applied Sciences*. 6(3): 268-274
- Sadr, M.H. (1984). Science and Islam: Is there a conflict? In *The Touch of Midas: Science, Values and Environment in Islam and the West*. London: Manchester University Press.
- Sardar, Z. (1992). *Arguments for Islamic Science*. Trans. Abdul Latif Samian. Hujah Sains Islam. Kuala Lumpur: Dewan Bahasa and Pustaka.
- Sarton, G. (1927). *Introduction to the History of Science*. Florida: Robert E. Kriger Publishing Company.
- Scott, W.A. (1965). *Values and Organizations: A Study of Fraternities and Sororities*.
- Shaharir Mohamad Zain. (1990). *Simbiosis antara Sistem Nilaidengan Tabi'I Matematik (Symbiosis between Value System and Natural Mathematics)* Bangi: Penerbit Universiti Kebangsaan Malaysia.
- Shaharir Mohamad Zain. (1991). Kritikan Awal Kepada Premis Ilmu Sains Tabi'i (Early Criticism to Premises of Natural Science). *Kesturi*. Vol. 1.No. 1.Pp. 81-93.
- Shaharir Mohamad Zain. (1992). Pengaruh Budaya keatas Matematik (Cultural Influence on Mathematics). *Kesturi*. Vol. 2. No. 1.Pp. 30-43.
- Shaharir Mohamad Zain. (1998). Toward a Quantum Leap in the Development of Islamic Science in Malaysia. In Anuar Ab Razak and Abu Bakar Abdul Majeed (Ed.). *Islam: Science and Technology*. Kuala Lumpur: Institut Kefahaman Islam Malaysia. Pp. 47-76.
- Shaharir Mohamad Zain. (2000). *Pengenalan Sejarah dan Falsafah Sains (Introduction to History and Philosophy of Science)*. Bangi: Penerbit Universiti Kebangsaan Malaysia.
- Shaharir Mohamad Zain and Abdul Latif Samian. (1989). Pengislaman Sains Matematik (Islamization of Mathematical Science). In Osman Bakar (ed.). *Islam dan Pemikiran Sains Masa Kini*. Kuala Lumpur: Akademi Sains Islam Malaysia (ASASI). Pp. 49-72.
- Spengler, O. (1932). *The Decline of the West. Chapter II: The Meaning of Numbers*. London: George Allen & Unwin Ltd.
- Super D.E. (1957). *The Psychology of Careers: An Introduction to Vocational Development*. New York: McGraw-Hill.