Science and Technology in The Islamic Perspective

Ahmad Dibul Amda

Sekolah Tinggi Agama Islam Negeri (STAIN) Curup ahmad_dibul_amda@yahoo.com

Abstract: This article attempts to discuss Islamic concept on science and technology from the perspective of al-Qur'an. Islam through the Qur'anic verses as the primary source of its teaching strongly recommand human to use reason, observation, listening as much as possible through the assessment process which result in rational thought. The characteristics of Islamic science is integration of the potential of reasoning, mind and revelation, or remembering and thinking, so that sciences created by Muslim scientists would clearly reflect Islamic values, become meaningful and bring mercy for the universe.

Key words: science, technology, al-Qur'an and Islam

Introduction

The Holy Qur'an is a key reference for all references, a source of all sources, a basis for all sciences and knowledge. The standard of the validity of the science must be measured by refering to the Qur'an. It is a mother book for science, where there is no any case missing in it,¹ everything has been fully covered in the qur'an and it regulates various aspects of human life, whether it is related to Allah (hablum minallah) or human beings (hablum minannas), nature, environment, social sciences, natural sciences, empirical sciences, theology, and so on. (QS. Al- an'am: 38). Furthermore Achmad Baiquni says: "In fact, all of sciences human need has been available in the Qur'an".

One of the extraordinary dimensions of the Qur'an is its relationship with science and knowledge as Allah revealed in the verse QS Al-'Alaq/96: 1-5:

¹ A. Baiquni, Islam dan Ilmu Pengetahuan Modern (Bandung: Pustaka. 1983), hlm. 1

Proclaim! In the name thy Lord and Cherisher, who created (1). Created man, out of a leech like clot (2). Proclaim! And thy Lord is Most Bountiful (3). He Who taught (the use of) the pen (4). Taught man that which he knew not (5).

The main intention contained in the above ayah is a command to read. it means to think regularly or systematically in studying the word and creation. Thinking about the correlation between *qauliyah verse* and *kauniah* one makes people to be able to discover the concepts of science and technology. Even, the first command ordered by God to the Prophet Muhammad P.B.U.H and Muslims before the other commandments is to develop science and to get it. Surely, to acquired knowledge is started by reading. Reading is the key of knowledge, including both *qauliyah* verse or *kauniah* one, because man was born without knowing anything. The knowledge was acquired through the process of learning and experiencing that is gathered by the mind as well as the senses of hearing and vision in order to achieve happiness in this world and hereafter.

In the Qur'an there are approximately 750 verses for references related to science, while other religions do not explain certain explanation or pay any attention or interest to science in human life. This proves that the Qur'an put a high the position of science and knowledge. The Qur'an persistently encourages people to leverage the potential of thinking, observing, and listening as much as possible through the assessment process which may result in rational acquisition.

Another opinion states that science is a complete description or consistent information about a serie of facts or experiences which are arranged according to certain methods and uses certain technical terms.²

From the above statement, it can be concluded that science is facts of human experience which is carefully and systematically into a coherent whole and interconnected and can be accepted by human's reason itself.

² Abuddin Nata, Al-Qur'an dan Hadits (Dirasah Islamiyah I) (Jakarta: PT. Raja Grafindo Persada. 1996), cet. ke-5, p. 99

In this case, the Qur'an gives very high appreciation of reason. There are a number of Qur'anic verses that advocate and encourage people to use intellect and to continue studying. By using reason and mind, knowledge can be acquired and developed. The present writing tries to discuss the concept of Islam on science and technology from qur'anic perspective.

Islam and Science

Islam is a religion whose teachings are originated from the Qur'an, even the Qur'an itself is a source of knowledge and inspiration in various sciences and technology. The Qur'an contains a lot of concepts of science and technology as well as praises toward those who have knowledge, so that Islam is the only religion in the world that is very firm and strong in encouraging Muslims to seek knowledge Islam.

In Q.S. Al-Mujadalah 58/11 Allah says: "Allah will raise those who believe among you and those who have knowledge some degree". There are several hadiths of the Prophet which encourage and even obligate Muslims to seek knowledge. As the word of His prophet say:

Seeking knowledge is obligatory for each muslim, both men and women

This hadith presents overwhelming urge for Muslims to seek knowledge, either general sciences or religious ones. As an obligation, seeking knowledge must be carried out, and it is sinful to avoid it. Further Prophet obligating Muslims to seek knowledge throughout his life, without being over the age limit, space, time and place as his saying "Seek knowledge from cradle to the grave". And "Seek knowledge even to China". Encouagement from the Qur'an and the command of the Apostle had been done by generations of Islam in the medieval period (7-13 century AD).

This has been proved by the many Muslim scientists appear to the world stage of scienceand technology, such as Al-Farabi, Al-Kindi, Al-Biruni, Ibn Rushd, Ibn Sina, Ikhwanusshafa, Ibn Miskwaih, Imam al-Ghazali , Nasir al-Din al-Tusi, Fakhrudin ar-Razy, Imam Hanafi, Imam Malik, Imam Shafi'i, Imam Hambali and others. The science that they have developed various disciplines, even covering all the branches of science that developed at that time, among others: the science of Philosophy, Astronomi, Physics, Astronomy, Astrology, Alchemy, Medicine, Optics, Pharmacy, Sufism, Fiqh, Tafsir, sciences of *Kalam* and so on. At that time the glory, wealth, and political power would exist under the control of the Muslims, because they mastered scienceand technology. The Apostle once said "My fellow will be victorious with the knowledge and treasure". Many other *hadiths* that give encouragement and motivation to the people to study, but on this occasion certainly can not mention them all.³

Qur'an, Science and Technology

Science and technology are one of the main contents content of the holy book (Qur'an). Even the word 'ilm itself referred to in the Qur'an as much as 105 times, but with derivative said it is called more than 744 times.⁴ Science is a religious requirement of Islam, how not every time Muslims want to establish worship always require the determination of time and place, like praying, determining the beginning of Ramadan, the pilgrimage, all have certain times and to determine the exact time takes the science of astronomy. So, in the Middle Age of Islamic history it was known the term "Science regarding certain times".⁵ Many other religious teachings implementation is closely related to technology, such as to perform the pilgrimage, praised the necessary vehicle spread Islam as a means of transportation. God has laid the outlines of Science and Technology in the Qur'an, man just explore, develop existing concepts and theories, such as contained in Q.S Ar-Rahman/55: 33.

O ye assembly of Jinns and men! If it be ye can pass beyond the zones of the heavens and the earth, pass ye! Not without authority shall ye be able to pass!

The above verse since fourteen centuries ago has hinted of scientific basis to the Jin and Men, that they have been allowedby God to explore in

³ *Ibid.*, p. 102

⁴ Roger Garaudy, Janji-janji Islam, tranl. Prof. HM. Rasyidi (Jakarta: Bulan Bintang.1984), cet. ke-2, p. 89

 $^{^5}$ Howard R. Turner, Sains Islam Yang Mengagungkan Sebuah Catatan terhadap Abad Pertengahan, (Nuansa, Bandung, 2004), p. 75

space for as long as they have the ability and strength (sulthan); the power is referred to here as in interpreting the scholars is science or science and technology, and this has been proven in this modern era, with the discovery of a means of transportation that is able to penetrate the outer space. Science and technology either invented by Muslim as well as by Western scientists in the past, present and future, everything is as evidence of the expression of the verses of the Qur'an, as far before the discoveries took place al-Qur'an had given cues about it, and this includes part of the miracle of the Qur'an, in which the truths contained therein is always proved scientifically.

The words "science" in its various forms is found in the verses of the Our'an so that repeated as many as 854 times. Furthermore, many verses of the Qur'an that advocate for the use of the mind, reasoning, and so forth, as stated by the verses that describe barriers to the advancement of science, among others:

- Surah 43: 78; 7:79 about subjectivity;
- Surah 33: 67; 2: 170 about *taqlid* or follow without reason;
- Surah 10: 36 on Wishful thinking and unwarranted allegations;
- Surah 21: 37 on hasty in making decisions or conclusions;
- Surah 7: 146 on the arrogant attitude and are reluctant to accept the truth:
- Surah 17: 36 on the prohibition of being against something without the knowledge base;
- Surah 36:17 on the prohibition set anything except really have to know first issue;
- Surah 10:39 on the ban reject something before any knowledge about it. Do not judge anything because whatever external factors even in the most exalted of personal character.

As it is noted, one proof of the truth of Al Quran is the science of the various signed disciplines. It is evident, that many verses in the Quran that discuss about the scientific nature of which is not known at the time of the decline, however attested in the middle of the development of science. They are as the following:

Surah 51: 47 about the theory of the expanding universe (expanding cosmos).

- Surah 10: 5 on the Sun is shining planet and the moon is the reflection of sunlight
- Surah 27: 88 on the movement of the earth around the sun, the movement of the layers that come from the earth, as well as the movement of the mountain the same as the movement of clouds.
- Surah 36: 80 on the substance green leaf (chlorophyll) that played a role in changing solar radiation energy into chemical energy through the process of photosynthesis to produce energy, in fact, the term Al Qur'an, al Syajar al Akhdhar (an evergreen tree) it is appropriate of the term chlorophyll (green leaves), because these substances not only contained in the leaves alone but in all parts of the tree, the branches and twigs are green color;
- Surah 86: 6 and 7; 96: 2 concerning that man was created from a small portion of male sperm and fertilization (conception) huddled in the uterine wall.
- QS. 2: 233 on the Children's Health Sciences. With breastfeed, newborn babies received breast milk that contains colostrum, which resulted in the baby rare infection, especially infection of the intestine. Mother's milk is milk that is most easily available, anytime and anywhere. More instant of milk anywhere and can be administered warm with optimal temperature and free from contamination.
- QS. 39: 5 on astronomy, Qur'an was revealed in addition to tell the one God, as well as to provide regulation (shari'ah) and for others, which are also to introduce the contents of the universe to man, far before scientists discovered the secret. The verse means ".... He furls the night over the day and the day over the night" It is as if Allah explains to mankind that: The Earth rotates (spins) on its axis, the Earth is round. Because when the earth is not round or it does not rotate on its axis, so one of these things happens, then as the surface of the earth that are on the Equator will even experience a state of prolonged night, otherwise the location perpendicular to the site will experience a state of prolonged afternoon.
- QS. 50: 9-11 and QS. 23: 18-19 about the Water Cycle and Marine.
 If at this time we read the verses of the Qur'an on water and human life, verse by verse, everything will appear to us as

passages that show the obvious. The reason is simple; in our day, we all know the water cycle in nature, even though we know it's not right the whole. But if we think of old concepts are sundry on this matter, we will find out that the verses from the Koran does not mention the things that had to do with the mystical concept that spread and influence of philosophical thinking is greater than results observation. In the verses of the Qur'an there are misconceptions, even more scientific.

- QS. 14: 32 about Ocean. Quranic verses have provided a comparison with modern science about the water cycle in nature in general, it will be felt, is the oceans. No verse of Qu'ran that tells about the marine as opposed to science. Likewise, it should be stressed that there is no Our'anic verses that talk about the oceans showing the relationship with the beliefs or myths. But some verses of the oceans and express shipping sign of the power of God that appears in the daily observations, which all that to think about.
- QS. 6: 125 about Altitude (Altitude). Indeed this is a simple idea to taste, 'bad' people feel a high place, and shall multiply if that person is in a higher place again.
- QS. 13: 12-13 and QS.24: 43 on Electricity in the atmosphere. Existing electricity in the atmosphere and its consequences such as thunder and ice grains mentioned in these two verses, also described the close relationship between the formation of heavy clouds containing rain or hail and thunder formation. The first highly sought after because of its benefits and the latter rejected people. The fall in thunder is God's decision. The relationship between the two phenomena of the atmosphere in accordance with the knowledge of the electric atmosphere that has been owned by a man now.
- QS. 25:45 about Shadow. Very remarkable phenomenon of our era, the shadows and the shift mentioned in these verses.6

For example, the scholars interpret the meaning of the word al-'alaq in the verses that describe the incidence of fetuses with al-dam al-jamid or a lump of frozen blood. And it can be concluded that the process of

⁶ Abuddin Nata, op cit, p. 107-110

human events consist of five periods : (1) *Al-Nuthfah*; (2) *Al'Alaq*; (3) *Al-Mudhghah*; (4) *Al-Idzam*; and (5) *Al-Lahm*.

If one studies the embryology and believes in the truth of Al Quran, he is difficult to interpret *al-'Alaq* with a lump of frozen blood. According to embryology, the process of human events is divided into three periods: (1). The Period of Ovum, (2). The Period of Embryo, (3). The period of the fetus.⁷

Verses like these that inspire scientists and realize science and childbirth thinkers and scientists of Islam in various disciplines. Nothing is better guided than a religious book covering the fields of science except the suggestion to think, and do not establish a statute that prevents the people to use their minds or delimit to increase knowledge during and anywhere he wants, as like Qur'an. The first and foremost is where the relationship between the Qur'an and science. The relation both can be found in the scientific cues scattered in so many verses in the Quran that talk about the universe and the phenomenon. These signs most of its have been known by the Arabic community at the time. But what they knew is still very limited in the details.⁸

And so on, so it is very fitting conclusion stated by Dr. Maurice Bucaille in his book, the Qur'an, the Bible and modern science, that not a single verse in the Qur'an as opposed to science. The Advance Nations (especially in the West) in the field of science and technology in this modern centuries is a continuation of the scientific tradition that has been developed by scientists Muslims in the Middle Ages or in other words, scientists Muslims have much to contribute to the West scientists, it is as expressed by Badri Yatim in his book *History of Islamic civilization* that Western progress was originally derived from Islamic civilization entered Europe through Spain.⁹

⁷ Armansyah, *Al Aquran dan Ilmu Pengetahuan*, http://www.geocities.com/arman_syah/

⁸ A. Baiguni, *op cit*, p. 78

⁹ Al-Fajlur Rahman, *Alqur'an Sumber Ilmu Pengetahuan*, terjemah Prof. HM. Aripin, M.Ed, (Jakarta: Bina Aksara, 1989), p. 143

Islam, Reason and Science

Islam puts sense as a means to strengthen the knowledge base of the Islamic someone so that he is able to distinguish between what is right and wrong, are able to make the best choices for themselves, other people, society, the environment, religion and nation.¹⁰ Thus, it means Allah has bestowedsense to humans, is a most valuable gift which is not given to any other creature, so that human beings are able to think critically and logically.

This means that Islam also come with the glory of nature and activate the mind and led him towards the work of Islamic thought rahmatan lil'alamin. It means that Islamic science is not a freely detached from ethical norms and religious, but he remained in control of religion, grow and develop with the growth and development of Islam. Because between religion and science in Islam there is no separation, even Islamic Science aims to move someone to a deeper understanding of the secrets contained in the verses of Allah, both verses *qauliyah* or *kauniyah* through the maximal utilization of the potential of the human mind, also means that Islamic science still refer to the original sources of the Qur'an and the Hadith, not only guided the intellect and human reason, but a blend between dhikr and think, because if it is just common sense and reason as the reference, it is not rarely findings contrary to religious teachings or misused to the things that deviate from the norms and religious teachings. Often the results of scientific discovery are not based on religious moral ethics, deviating from the teachings of religion and it is understandable because the reason has limits to reveal the true values if not supported and guided by revelation.

Characteristics of knowledge not only be seen through many contributions that are provided to the community or set of ideas and methods are developed, but also on a set of requirement of psychological and social factors embodied, so have (positive or negative) effect to the advancement of science. 11 This means that each of Sciences produced by

¹⁰ Badri Yatim, Sejarah Peradaban Islam, (PT. Raja Grafindo Persada, Jakarta, 1997), p. 2

¹¹ R.H.A. Sahirul Alim, Menguak Keterpaduan Sains, Teknelogi dan Islam, (Titian IlahiPress, Yogyakarta, 1999), p. 71

human reason should not devoid of religious spirit. In human social history has proved that when Galelie Galileo put the results of scientific discovery, he did not get a challenge from a scientific institution, but he faces tough challenges and reaction of the society where he lives. They challenged him on the basis of religious beliefs. Galileo eventually become victims as a result of the discovery that does not touch the bottom of society and the religious spirit. Also means that the Islamic science is the integration between the potential of reason and revelation, dhikr and think, so that sciences produced Muslim scientists are meaningful and colourfull with Islamic principles, bringing the coolness of the universe. meaning benefits for mankind in accordance with the Islam rahmatan lil'alamin mission. Also means that Islamic Science is always tied to the values and norms of religion and always refer to the Qur'an and Sunnah, and he helped deliver the inventors to the understanding, belief is more perfect to the true information contained in the verses of Allah, which in turn can increase the faith, devotion to God, acknowledged grandeur, greatness of Allah.

The words or statements used in the Qur'an to describe the activity of thinking besides the word `aqala also with other words. The following are among them.

Nazara is viewed in the abstract, in the sense of thinking and reflecting. This word is contained more than 30 ayah, which were contained in the Qur'an surah Ghashiyah verses 17-20, which means: "Do they not look at the camels how they are made? And the sky how it is raised high? And at the mountains, how they are fixed firm? And at the earth, how it is spread out?". The devine command to contemplate the universe, both the life and the creatures, as stated in the verse above, and the assurance that the laws that control the universe remains unchanged, holds promise if we obey such an order, then we will find the majority of laws which set him and we will be able to master the science and develop technology for human happiness. The word "nazara" can mean accumulating knowledge through observation or measurement or data collection on the natural world around us. Thus, the recommended nazara Quran turned out to be a common practice of experts in developing modern science.

Tadabbara is contemplating something explicit and implicit. The word is often found in the verses of the Qur'an, which were contained in

the surah of Muhammad verse 24, which reads: "Do they not then earnestly seek to understand the Qur'an, or is that there are locks upon their hearts?" By doing tadabbur as mentioned in the ayah above, then the man will be delivered to the fact that the Our'an adds a new dimension to the study of explicit thing such verses of the Qur'an and the signs found in nature (ayah kauniyah), and helps the human mind to make a breakthrough against the barriers of the material universe. The Qur'an indicates that the material is not something dirty and without value, but in it there are signs that lead men to God and show His glory. The universe is God's creation, the Our'an invites people to investigate and uncover the wonders of nature as well as trying to take advantage of abundant natural resources for the welfare of human life. So the Qur'an brings people to know and draw closer to God through His creation and concrete reality contained in the universe. This is in line with the activity in the world of science, which is making observations, conduct experiments and draw conclusions about the laws of nature that is based on observations and experiments. With the knowledge that humans can achieve the Creator through a meticulous and precise observation of the laws governing natural phenomena and the Qur'an to show the reality of intellectual Almighty, that Allah through His creation. In this way will materialized balance between scientific progress and elevation faith in Allah.

Tafakkara is thinking deeply. This word contained in the Qur'an as much as 16 verses, among them as Allah says in the Qur'an sura Jâsiyah paragraph 13 which reads: "And He has subjected to you, as from Him, all that is in the heavens and on earth: Behold, in that are Signs indeed for those who reflect".

Faqiha that is understood in depth. The word is found in the Qur'an in number of 16 verses, among them His word in the Qur'an sura *Al-Taubah* verse: 122, which reads: "No should the Believers all go (to fight). Why some of each group did not go deepen understanding of the religion in order to give a warning to his people, when they come back. Hopefully they keep watch ". Those verses encourage the scholars of classical times to learn the knowledge from various sources by doing some translation various of science that started in VII century.

Tazakkara that is understood in the form of a deep understanding. For example, the word of God in the Qur'an surah al-Anbiya verses 78-79) which reads: "And remember Dawud and Sulaiman, when they gave judgment in the matter of the field into which the sheep of certain people had strayed by night: We did witness their judgement. To Sulaiman We inspired the right undersatnding of the matter: to each of them We gave judgement and Knowledge; it was Our power that made the hills and the birds celebrate Our praises, With Dawud: it was We who did (all these thing)."

Aqala is use common sense or reason. In the Qur'an is not less than 45 verses that speak of the use of a mind that is an integral part of the development of science. For example, Allah says in the Qur'an Surah al-Anfal verse 22, which reads: "For the worst of beasts in the sight of Allah are the deaf and the dumb, those who understand not". 12

By paying attention to the verses above, it is clear that the Qur'an contains many orders to people to investigate nature (cosmos). Nature is full of signs that must be considered ,researched, and thought by humans so that they know the secret was contained behind the signs. Deep thought about the signs that led to an understanding of the various phenomena of nature itself. This will give birth to a strong belief in the existence of God the Creator of nature and the natural laws that govern nature trips. On the other side of the deep thinking, it will obtain findings in various fields of science.

The Relation between Science and Islam according to Scientists

Muslim scientists split on the relationship of science and Islam into three groups. First, the group considered that science is neutral and universal. They look for formulas in the Qur'an that fits with the findings of modern science. They conclude that the formulation in the Qur'an is perfect with the findings of modern science. This approach looks thick of the work of Maurice Bucaille; the Bible, the Qur'an and Science widespread. This group sometimes called Buchaillisme. The message conveyed is with this match proves that the Qur'an is a book that has the ultimate truth that comes from the creator of the universe. This approach

¹² M. Dawam Rahardjo, *Ensiklopedi Al-Qur'an Tafsir Sosila Berdasarkan Konsep-konsep Kunci*, (Paramadina, Jakarta, 2002), p. 531.

looks great benefit with the message delivered. However, according to Sardar, there is a need to watch out with this approach, namely the Our'an can be seen as a book of science and not a book of wisdom. Muslims read the Qur'an more trying to interpret his knowledge just to diluting its role as a guide of life. Another danger to watch out for, according to Sardar, is the purpose of science and technology development limited to proving formulas of science in the Qur'an so that it does not lead Muslims to be creative and innovative in very broad forest science. The Our'an should be the starting point of the development of science and not as the end of the estuary of the development of science.

Secondly, the group still maintains neutrality and universality of science, but its function should be changed directed towards the ideals of Islam and its people. This group, according to Sardar, was spearheaded by Z.A. Hasyimi of Pakistan. He recommends that Muslim scientists were able to eliminate elements not desired in western science. They must understand the history and philosophy of science and awareness of the future development of science. Many Muslim scholars can be categorized in this group, including Nobel laureate Abdus Salam. He had asserted: "I can not see any difference in the spirit of modern algebra with Muslim scientists do, or a tradition of modern optics with Alhazen or between observations Razi with modern extension." Sardar criticized the group by stating that the group is too downplaying the role of science in society changes. He was worried, with the approach of modern science were rooted in western value system can destroy existing value system in Islamic societies, including conflict of interest between the goals of Western science with the goal of Islamic society.

The third group is the group that is not convinced with the neutrality and universality of science. They argue that Western science is built with the perspective and Western philosophies, including looking at reality. This group believes the construction of science needs to be rebuilt with an Islamic perspective. Sardar included to this group. Deliar Noer a little bit disagree with this group. He stated that it is too complicated, time consuming and has a very big challenge.¹³

¹³ R.H.A. Sahirul Alim, op cit, p. 19-28

Conclusion

Qur'an is the Book Resources, the main reference for all referrals, the source of all sources, the basis for all sciences and technology, the standard of the validity of the science must be measured based on it. One of the main miracles of Qur'an is its relationship with science, so the importance of science was revealed in QS. Al-'*Alaq/*96: 1-5.

The Qur'an also always order the man to leverage the potential of sense, observation, listening, much as a human possible collected through the assessment process and be accepted by the ratio. Science is one of the main content ofthe holy book (Qur'an). Even the word 'ilm itself referred to the Qur'an as much as 105 times, but with derivative it called more than 744 times. The characteristic of Islamic science is the integration of the potential of reason and revelation, a unity of dhikr (remembering) and fikr (thinking), so that the resulting science by Muslim scientists is true Islamic, meaningful, bringing the coolness of the universe.

Bibliorgaphy

- Abuddin Nata, *Alqur'an dan Hadits (Dirasah Islamiyah I)*, (Jakarta: PT. Raja Grafindo Persada, 1996)
- Al-Fajlur Rahman, *Alqur'an Sumber Ilmu Pengetahuan*, terjemah Prof. HM. Aripin, M.Ed, (Jakarta: Bina Aksara, 1989)
- Badri Yatim, Sejarah Peradaban Islam, (PT. Raja Grafindo Persada: Jakarta, 1997)
- Howard R. Turner, Sains Islam Yang Mengagungkan: Sebuah Catatan terhadap Abad Pertengahan, (Bandung: Nuansa, 2004)
- M. Dawam Rahardjo, *Ensiklopedi Alqur'an: Tafsir Sosial Berdasarkan Konsep-Konsep Kunci*, (Jakarta: Paramadina, 2002)
- Roger Garaudy, *Janji*-janji *Islam*, Terjemahan Prof. HM. Rasyidi, (Jakarta: Bulan Bintang, 1984)
- R.H.A. Sahirul Alim, *Menguak Keterpaduan Sains, Teknologi dan Islam,* (Yogyakarta: Titian Ilahi Press, 1999)
- http://www.geocities.com/arman_syah/