

## CHAPTER II

### HISTORY OF SCIENCE AND OTHER SCIENCES

#### A. Definition of Science

Etymologically, science comes from English word, namely knowledge, which means right belief (knowledge is justified true belief). While in terminology, science is the result of the process of human effort to know. Knowledge not have a structured method, both in terms of the metaphysical and physical yet. In addition, the knowledge can be regarded as common sense information, while science has certain methods and mechanisms<sup>1</sup>. Through the process of collecting a variety of questions, both about himself, the neighborhood or ask questions about the events that occurred in the vicinity, knowledge can be understood as the product of curiosity, which is understood after observed, witnessed and experienced<sup>2</sup>.

In Arabic word, science is derived from '*alima, ya'lamu,*' *ilman* which means to understand, really comprehend. In English word science called knowledge and in Latin word is called *Scientia* (knowledge) -*scire* (knowing). Synonyms science that is closest in Greek word is *episteme*<sup>3</sup>. Mulyadhi Kartanegara explains the science is organized of knowledge. According to Mulyadhi, knowledge and science are not different, especially before 19 ages. However, after 19th century, science is divided into limited in physical or sensory field, while science is tended to non-physical field, such as metaphysic<sup>4</sup>. Terminologically, the meaning of science is some coherent knowledge, empirical, systematic, measurable and proven. Science signifies the unity of ideas that refer to the same object and logically interrelated<sup>5</sup>.

Science means knowing the circumstances or facts and is often taken in the sense of knowledge that contrasted with intuition and trust. The science is the scientific knowledge or knowledge that qualifies (legal). Thus, the knowledge that not qualified or outside the provisions is not included science. Achmad Baiquni

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<sup>1</sup>Amsal Bakhtiar, *Filsafat Ilmu*, Jakarta:PT. Raja Grafindo Persada, 2005, p.16-17

<sup>2</sup>Jalaluddin, *Filsafat Ilmu Pengetahuan*, Jakarta:PT. Raja Grafindo Persada, 2013, p.85

<sup>3</sup>Jujun. S Sumantri, *Filsafat Ilmu:Sebuah Pengantar Populer*, Jakarta:Pustaka Sinar Harapan, 1998,

<sup>4</sup>Mulyadhi Kartanegara, *Pengantar Epistemologi Islam*, Bandung:Mizan, 2003, p.1

<sup>5</sup>Amsal Bakhtiar, *op. cit.*, p.13

explains that science is the set of human knowledge gathered through process and acceptable to think and reason. Thus, it can be said that science is a collection or set of collective human rationality<sup>6</sup>.

The concept of science in Western view and Islamic view are different. West looked at the natural is a group of science that uses a natural phenomenon as the object of study. Epistemologically, natural sciences have been studied by Immanuel Kant who initially questioned the conditions of possibility of knowledge (the terms of the possibility of knowledge). In this way, Kant tried to check the validity of natural science and metaphysics<sup>7</sup>. Kant explains that all human knowledge occurs because syntheses between the elements of *a priori* (separated from the experience) and *a posteriori* (based on experience)<sup>8</sup>. Then he made a recognition process that are graded, there are stage of sensory experience, the stage of the intellect (*Verstand*) and phase ratio (*Vesnunft*). At the stage of sensory knowledge, knowledge has had elements of a priori and a posteriori. Element of a priori is space and time, so the object is known empirically is not a thing in itself, but a symptom of the object itself. These symptoms can be known for their synthesis between things that come from the objects and things that come from the subject of knowledge, which is a priori of space and time<sup>9</sup>.

The second stage is intellect (*Verstand*). Intellect serves to organize and process the data of sense to become a regular synthesis. The last stage is the stage of reason (*Vernunft*). At this stage, knowledge is the result of the synthesis between the decisions that have been produced at the stage of the intellect (*Verstand*) to make the argument. At this stage, the ideas that became the reference frame are synthesized with propositions to produce a rational argument. This is called Kant as *pure reason*<sup>10</sup>. In Kant's research, investigation metaphysics is things could not possibly do because it goes beyond the requirements specified in science. God, present, soul investigated by metaphysics is the ideas in the ratio and would be useless to accurate because all three can not be proved, in some sense. Starting from Kant, sensory knowledge becomes a norm for all activities of knowledge and the validity of are questionable, while the validity of the natural sciences

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<sup>6</sup>Jalaludin, *Filsafat Ilmu Pengetahuan*, Jakarta:Rajawali Pers, 2013, p. 98

<sup>7</sup>K. Bertens, *Ringkasan Sejarah Filsafat*, Yogyakarta:Kanisius, 1981, p.60-62

<sup>8</sup>Hadiwijono Harun, *Sejarah Filsafat Barat 2*, Yogyakarta:Kanisius, 1991, p.67

<sup>9</sup>Ilyas Supena, *Paradigma Unity of Sciences IAIN Walisongo dalam Tinjauan Filsafat Ilmu*, Penelitian Individual, Semarang:IAIN Walisongo, 2014, p.67-68

<sup>10</sup>Ibid., p.71

strengthened philosophically<sup>11</sup>. From Kant's thought, born understood positivism pioneered by August Comte. Positivism emphasizes empirical data-verification, where knowledge-particularly nature-to be the only *being* at once the norm for knowledge activities. Positivist world view, science is defined as the ways to get the truth, to understand the world well enough so that we might Predict and control it. And the natural world is believed to be predeterministik, because they-and the natural world-according to the law of cause and effect that can be understood by applying scientific methods<sup>12</sup>.

Ontologically, Islam considers that all reality comes from God. There is no reality outside of God and there is no separate reality into a sub-system has its own existence outside of God's will. All of the material world, nature and the human being obedient to the laws of nature (the laws or *sunnatullah*). Therefore, science is the concept of the reality of the manifestation of the presence of God in the empirical world. Ilyas Supena quoted the opinion of Syamsudin Arif that there are three sources of knowledge. First, the perception of sensory which includes the five senses (auditory, taste, sense of sight, smell and hand), and added a sixth sense called *al-hiss al-mushtarak* or census communis that included memory or memory (*dhākirah*), power depictions (*imaginary*) and *wahm*. Next is the reason (*ta'aqul*) which includes the flow of thought and reason. Through this process, people can articulate, organize proposition, opinion, do analogies, stating arguments, make decisions and draw conclusions. Sources last science is intuition heart (*qalb*) that can capture messages unseen, gestures divine, receive inspiration, *fath*, *kashf* and others<sup>13</sup>.

In Islam view there is other term than science, namely *ma'rifah*. Science and *ma'rifah* have the same meaning as knowledge, but *ma'rifah* tends to be used for the knowledge gained from reflection and religious experience. Islamic science is often understood in a broad sense and narrow sense. In a broad sense, the Islamic sciences include a constellation of various disciplines. These sciences such as fiqh, theology, usul fiqh, interpretation of Qur'an and the history of Prophet and the Infallible Imams and other sciences that come from other civilizations, such as

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<sup>11</sup>F. Budi Hardiman, *Kritik Ideologi:Menyingkap Kepentingan Pengetahuan Bersama Jurgen Habermas*, Yogyakarta:Buku Baik, 2004, p.132

<sup>12</sup>William M.K Trochim, *Positivism and Post-Positivism*, lihat website *Billing/d/hrw/positivism* and *post-positivism.htm*, downloaded on 10/09/2016

<sup>13</sup>Ilyas Supena, *Paradigma Unity of Sciences IAIN Walisongo dalam Tinjauan Filsafat Ilmu*, Penelitian Individual:IAIN Walisongo, 2014, p.83-84

astronomy, medicine and mathematics. While in the narrow sense, Islamic science derived from the principle of Islamic science and Islamic sources, there are Qur'an and Hadith. To understand the source of Islam, it is necessary logic of science, literature and Arabic grammar, Islamic history, references relating to the understanding of the Qur'an, the science of reading the Qur'an and science to verify Hadith narration.

The source of knowledge is a fundamental part for emergence of science in human life. The source of knowledge between the West and Islam are very different. According to Muslim scholars, knowledge comes from revelation manifested in the Qur'an and as-sunnah, in addition to empiricism and rationalism. Quraish Shihab divide science into acquired knowledge and perennial knowledge. Acquired knowledge is knowledge gained from human effort with a scientific approach, through research, surveys, experiences, experiments and other scientific means. While perennial knowledge obtained without human effort. In the approach to the revelation (Quran), acquired knowledge called *'ilm kasbi* and perennial knowledge called *'ilm Ladunni*<sup>14</sup>. Meanwhile, in Western eyes, there are two main sources of the knowledge derived from the consideration ratio (deduction or sense) and knowledge generated through the experience (empirical and induction)<sup>15</sup>. Amsal Bakhtiar wrote there are four sources of knowledge. The first is empiricism, which means that the knowledge gained from using sensory experience. By using the inductive method will generally acquired knowledge through observation of physical symptoms the individual<sup>16</sup>.

The second source is a rationalism which declares that reason is the basis of certainty of knowledge. Through human reason can gain knowledge through the activities capture the object. This understanding does not reject the use of sensory experience. Sensory function to obtain data from the real world, then sense will link data with other data<sup>17</sup>. Rationalists use the deductive method in compiling knowledge. The premise used in reasoning obtained from ideas that are considered clear and reasonable. Rationalists assume that the idea is not a human creation.

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<sup>14</sup>M. Quraish Shihab, *Wawasan Al-Qur'an:Tafsir Maudhu'I atas Pelbagai Persoalan Umat*, Bandung:Mizan, 1996, p.435-436

<sup>15</sup>A. Susanto, *Filsafat Ilmu:Suatu Kajian dalam Dimensi Ontologis, Epistemologis, dan Aksiologis*, Jakarta:Bumi Aksara, 2011,p.186

<sup>16</sup>Jujun. S Suriasumantri, *Filsafat Ilmu sebuah Pengantar Populer*, Jakarta:Pustaka Sinar Harapan, 1996, p.52

<sup>17</sup>Amsal Bakhtiar, *Filsafat Ilmu*, Jakarta:PT.Raja Grafindo Persada, 2005, p.98-103

This principle has existed long before humans thought about it. The function of the human mind only recognizes the principle and then shape it into knowledge. Through rational reasoning would be obtained various forms of knowledge of a particular object without any differences that can be accepted by all parties. This thinking tends solipsistic and subjectively<sup>18</sup>.

The third source is through intuition. Henry Bergson defines intuition as a result of a supreme understanding of evolution. Intuition is almost similar to the instinct, but differ on the consciousness and freedom. The development of intuitive abilities require an effort<sup>19</sup>. Intuition can be used as a hypothesis for analysis to determine whether or not a statement. Illuminationism is understood that one might say almost like intuition. In Islam illumination is called *ma'rifah*, the knowledge gained from God through illumination and enlightenment<sup>20</sup>. *Ma'rifah* can be obtained by humans when doing *riyāḍah* and certainly intended for people whose heart is clean, ready and able to accept such knowledge. In the Western world, intuition gained through contemplation and thought consistent, but in Islam, *ma'rifah* obtained through reflection and illumination of God. The fourth source is through revelation. Revelation is the knowledge that comes from God to man through an intermediary prophet. Knowledge through revelation contains both human life affordable by the experience, as well as transidental problems, such as the background and purpose of the creation of man, the world and the world hereafter<sup>21</sup>.

The knowledge acquired by human through various sources above, have a method in the theory of knowledge. There are five methods of science. First, the inductive method. Induction is a method that concludes the statement observations in a more general statement. Inductive method starting from a single statement to a universal statement. Second, the deductive method. Deductive method is a method concludes empirical data is processed through the system a coherent statement. This method must have a logical comparison between different conclusions have been obtained. Then, there is a logical investigation between theory and purpose whether the theory has empirical or scientific nature, there is a comparison with

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<sup>18</sup>Jujun. S Suriasumantri, *op.cit.* p.51

<sup>19</sup>Ahmad Tafsir, *Filsafat Umum, Akal, dan Hati sejak Thales sampai Capra*, Bandung:Remaja Rosdakarya, 2002, p.27

<sup>20</sup>Bakhtiar Amsal, *Filsafat Ilmu*, Jakarta:PT.Raja Grafindo Persada, 2005, p.50

<sup>21</sup>Jujun. S Suriasumantri *op.cit.*, p.54

other theories, as well as testing the theory by applying empirical conclusions can be drawn from the theory. Third, the method of positivism hold on to what is already known, factual, and positive. What is known is positively is all it seems. The positivism method pioneered by August Comte (1798-1857) rejecting metaphysics<sup>22</sup>. In this method, the study of the theological and metaphysical rendered useless because of received in this method is science as the only form of certainty.

The fourth method that is contemplative. In this method, the intellect has limitations in acquiring knowledge. Thus, the resulting object was different and should be developed through intuition. The knowledge gained through this intuition can be done by way of contemplation as practiced by al-Ghazali. In Sufism, intuition is called *ma'rifah*, which is the knowledge that comes from God through enlightenment and illumination. Al-Ghazali explained that intuitive knowledge of this individual and the knowledge of the most correct and cannot be used for profit. The latter method is dialectical. Initially, this method is defined as a question and answer method taught by Socrates and Plato defines it as a discussion of logic. But now, this method is defined as a stage of logic which teaches the rules and methods of the narrative, and also a systematic analysis of the ideas to achieve what is in view<sup>23</sup>.

In philosophy, the concept development stage, there is a moral issue in terms of scientific ontology, while in the stage of implementation of the concept, moral issues must be viewed in terms of scientific axiology. Axiology is a theory of value. The study of the nature of value and show the rules that must be considered in applying the science into practical terms. The linkage of science with moral values have been debunked at the time of Copernicus issued a theory of the earth around the sun and its peak in 1633. Galileo Inquisition forced Galileo religious court to revoke his statement that the Earth revolves around the sun in period of two and a half centuries after the Inquisition Galileo, the scientists struggle to uphold the interpretation of nature as it is under the motto "value-free science". After experiencing about of science, scientists finally obtain the victory, namely knowledge gained autonomy in their research<sup>24</sup>. This conflict is not only on

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<sup>22</sup>Amsal Bakhtiar, *Filsafat Ilmu*, Jakarta:PT.Raja Grafindo Persada, 2005, p.154

<sup>23</sup>Ibid., p.156

<sup>24</sup>Ibid., p.168

natural science, but also in the social sciences where various ideologies try to influence the scientific metaphysics. Autonomous scientific eventually evolved into a form of technology that is defined as the application of scientific concepts in solving practical problems<sup>25</sup>.

Under consideration axiology science, Jujun S. Suriasumantri explained that scientists have different view. Jujun categorized these into two groups who argue about the usefulness of science. The first group continued the tradition of neutrality of science as in the era of Galileo. While the second group, try to adjust science neutrality pragmatically based on the development of science and society. The second group argues that science is morally should show kindness to humans without changing the dignity and human nature<sup>26</sup>. In Axiology, a scientist must have a normative ethics that aims to make every scientist can apply moral principles, so that they could account for behavioral science. The issue of scientific ethics always refers to a moral code, that conscience, freedom and responsibility, values and norms that are utilitarian (usability). The conscience is defined about the good and bad that are connected by human behavior. Moral values do not stand alone, but have a relationship with a value of religion, law, culture, and so when moral values belong to someone. The most important thing in moral values is one's responsibility.

Science should be open to the context, in this case religion into context. Religion directs the science to understand the reality of nature and understand the existence of God, so that human will always remember the nature of creation itself. Another purpose in order that science is not always oriented to the level of praxis or easiness material world. The Qur'an provides solutions for science is bound primarily to value by restoring science to good place, so that the knowledge to be a blessing and a mercy for mankind, and not give bad impact<sup>27</sup>. The responsibility for a scientist is a reflection of the moral obligation (moral imperative). It is important for a scientist to have a sensitivity to ethical consequences of science. Technology was formed based on the theories of scientific truth and provide benefits for human survival and the achievement of the purpose of life. This value is often overlooked by humans in the development of science and technology. And

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<sup>25</sup>Jujun. S Suriasumantri, *Filsafat Ilmu sebuah Pengantar Populer*, Jakarta:Pustaka Sinar Harapan, 1996, p.233

<sup>26</sup>Ibid., p.235

<sup>27</sup>Moeflih Hasbullah, *Islamisasi Ilmu Pengetahuan*, Jakarta:PT. Pustaka Cidesindo, 2000, p.26

this aspect is the object of study of axiology, it is the relationship utilization of science and technology with the value system<sup>28</sup>.

## B. History of Science

The development of Western epistemology starts since the days of Classical Greece to contemporary century now. Charles Patterson (Western Philosophy vol. I, 1970 and vol. II, 1971) as cited by Aholiab Watloly, the history of Western epistemology classified into two periods. First, from the time of Thales to the time Giordano Bruno (60 BC-1600 AD) metaphysical cosmology. Second, in the days of the middle ages to contemporary today (17-20 century). In this period, the ratio of human is more inclined to use in the throes of cultural development of science, and invites divisions that are revolutionary science that evolved towards awareness of the unity of the diversity that characterizes the contemporary era<sup>29</sup>.

### 1. Period of Classical Greece (600 BC-200 BC)

At this time, the human search for knowledge of the universe through the mythology that later turns into *an inquiring attitude* (attitude who likes to critically examine anything). It is this attitude makes human beings have the freedom to think and express ideas or opinions as well as the growing of science. In line with this rational consciousness, eventually it appears the logic and principle of contradiction, the conclusion is based on the logic of right and wrong<sup>30</sup>. Plato (427-347 BC) describes the true knowledge comes from contemplation of the truth through the dialectic method which consists of an understanding of the specific things that separate a section of ideas and the ideas to the process of generalization and classification. Plato explains that science is knowledge at final conclusions drawn by syllogistic reasoning<sup>31</sup>.

For him, the goal of science is to prove comprehensively an object through a syllogism, where conclusion depends on the premises early. In contrast to Plato, Aristotle viewed knowledge as a reciprocal relationship between subject and object

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<sup>28</sup>Jalaluddin, *Filsafat Ilmu Pengetahuan*, Jakarta:PT. Raja Grafindo Persada, 2013, p.166

<sup>29</sup>Aholiab Watloly, *Tanggung Jawab Pengetahuan: Mempertimbangkan Epistemologi secara Kultural*, Yogyakarta:Pustaka Filsafat, 2001, p.57

<sup>30</sup>Jalaludin, *Filsafat Ilmu Pengetahuan*, Jakarta: Rajawali Pers, 2013, p.22

<sup>31</sup>Ahmad Charis, *Dimensi Etik dan Asketik Ilmu Pengetahuan Manusia*, Yogyakarta:Lesfi, 2002, p.87-

with different implications<sup>32</sup>. Furthermore, he asserts that in heaven knowledge has nothing to do with what are the main (primary), and the differences in knowledge representation differences of various causes; it is a metaphysical to provide knowledge about underlying types<sup>33</sup>.

## 2. Middle Ages Period (500 BC - 1500 BC)

This century is signing by development of Christianity in Europe and has an impact on the development of science and epistemology growth. The problem at this time turning on the existence of God, the Trinity, God in human flesh, the relationship between human and God, and sins and etc<sup>34</sup>. Under the motto "servant of theology," the cultural upheavals led to the knowledge called science of theology and all geared to support theological truth. In addition, almost all philosophers of this century was the theologians and the characteristics of his thinking is theocentric, because philosophy is used to strengthen the Christian religious dogmatic.

Augustine (354-430) have a major influence on the Middle Ages. In terms of science, he found studying natural science can help human beings even can also be a threat or danger<sup>35</sup>. In his view, nature has been dominated by naïve teleology, the world of the universe was formed to carry out the commands of Jesus resurrection. Why should there be seven planets? The reason given by Augustine is to remind human of the seven essential virtues and warns people to be the seven deadly sins. Therefore, the physical world created by Christ to guide people towards the rescue.<sup>36</sup>. At this time, the Romans more preoccupied with religious issues that continue studying sin and how to eliminate them. So, science does not grow and decline.

In the view of Christian monotheism, knowledge is a reflection of the idea that has been governed by the laws of God, the creator and legal determinants<sup>37</sup>.

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<sup>32</sup>Aholiab Watloly, *Tanggung Jawab Pengetahuan: Mempertimbangkan Epistemologi secara Kultural*, Yogyakarta: Pustaka Filsafat, 2007, p.6

<sup>33</sup>Abdul Muhayya, *Konsep Wahdat al-Ulum Menurut Imam Al-Ghazali*, Penelitian Individual: IAIN Walisongo, 2014, p.27

<sup>34</sup>Aholiab Watloly, *op.cit.*, p.65

<sup>35</sup>*Ibid.*, p.129-130

<sup>36</sup>W.T Jones, *A History of Western Philosophy: The Medieval Mind*, USA: Wadsworth, p.84

<sup>37</sup>Abdul Muhaya *Konsep Wahdat Al-Ulum Menurut Imam Al-Ghazali (W.1111 M)*, Penelitian Individual, Semarang: IAIN Walisongo, 2013, p.29

Knowledge accord to Johannes Scotus Eriugena is illumination or lighting. Everything that exists is the divine nature which is reflected in some perspective or another perspective<sup>38</sup>. Then, to know things around us must know of the existence of God. Whatever the results of the analysis of the philosopher and psychologist might provide a plausible reason and science, however, John as a Christian still believe that knowledge is basically something that is freely given by God for the illumination of his or enlighten him into a mind human.

### 3. Renaissance

The word renaissance literally means rebirth, which in this age philosophers believed that the ratio is the most important human strength. Moreover, in this era of the existence of the church began to crumble, and appear the fervor to break away from religious dogmas that have long trammel human thought. In the Renaissance era, people return to the pure sources, namely science. The main characteristic of the Renaissance was humanism, individualism, and separated from religion<sup>39</sup>.

The thinkers of the Renaissance initiated an idea of emancipation which means the loss of human dependence on religious dogma and fear of taboos. Therefore, enlightenment also encourage the process of secularization that is release of areas of society from religious symbols<sup>40</sup>. Science is the most developed rapidly in this period is astronomy and the natural sciences. Roger Bacon said that the empirical experience becomes the main foundation for the beginning and end of all science<sup>41</sup>. According Bacon that science is empirical research (sensory) and can test the truth<sup>42</sup>. Knowledge is power is the motto Bacon meaning, through sensory knowledge, humans can control everything. Because empirical knowledge is both functional and can be used to promote human life. While power is defined as the power of nature. Basic science, according to Bacon consists of three

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<sup>38</sup>W.T Jones, *op.cit.*, p.179

<sup>39</sup>F. Budi Hardiman, *op.cit.*, p. 08

<sup>40</sup>Ibid., p.98

<sup>41</sup>Aholiab Watloly, *Tanggung Jawab Pengetahuan:Mempertimbangkan Epistemologi secara Kultural*, Yogyakarta:Pustaka Filsafat, 2007, p.68

<sup>42</sup>F. Budi Hardiman, *Pemikiran-pemikiran yang Membentuk Dunia Modern:Dari Machiavelli sampai Nietzsche*, Jakarta:Penerbit Erlangga, 2011, p.25

capabilities, there are memory (*memoria*), imagination (*imagination*) and reason (*ratio*)<sup>43</sup>.

The French philosopher gives intellectually critical reactions appear in the form of materialism and the worship of the natural sciences. Because the natural sciences give promise of prosperity of the world through the invention of technology and industry. In terms of morality, Pierrer Bayle argued that morality must be separated from all religious considerations as the motive and religious belief is not necessary to establish a morality. It said too by D'Alembert who said ethics should be separated from theology and theology had to be separated from metaphysics. The reason is because morality show the compatibility between human self-interest and obligations to fellow human beings<sup>44</sup>.

#### 4. The Modern Age

The modern age is the period in which human becomes the center of all the changes and patterns of thought-oriented philosophy in anthropocentrism. The role of substance taken over by humans as a 'subject' which is located underneath the entire reality and bear the reality that surrounded them<sup>45</sup>. Modernity has three characteristics, there are subjectivity, criticism, and progress. Subjectivity means making man the measure of all things. While criticism, complementary elements of subjectivity that is useful to break free from the shadow of tradition and things that are misleading. With criticism of subjectivity and is expected to produce a progress. Progress means people realize the importance of time to fix the future<sup>46</sup>.

There are two most important things in modern history, there are the collapse of the authority of the church and the strengthening of the authority of science<sup>47</sup>. The emergence of various scientific discoveries which intensified in the 17th century too, became a real indicator of the rise of the modern age. Another characteristic of our time is the emergence of schools of philosophy that begins with rationalism and empiricism, and other philosophical schools are springing up to fill the sheet of modern philosophy. Rationalism is understood philosophy for

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<sup>43</sup>Verhaak S.J dan Imam Haryono, *Filsafat Ilmu Pengetahuan*, Jakarta:Gramedia,1989, p. 139

<sup>44</sup>Ibid., p. 106

<sup>45</sup>Ibid., p. 02

<sup>46</sup>F. Budi Hardiman, *Pemikiran-Pemikiran yang Membentuk Dunia Modern:Dari Machiavelli sampai Nietzsche*, Jakarta:Penerbit Erlangga, 2011, p. 03

<sup>47</sup>Betrand Russels, *Sejarah Filsafat Barat*, Pustaka Pelajar:Yogyakarta, 2007, p. 645

which reason is the most important tool in gaining and testing knowledge. Rene Descartes (1596-1650) was the first philosopher thinking modernity that characterizes the ratio approach in investigating human subjectivity. He has a theory of knowledge by way of doubting everything. This method will help find basic fact is certain and true. Feature truth Descartes referred to as truth in oneself (*self-evident truth*). With truth and certainty of this, the development of knowledge can weightness certainty. Skeptic methods which is used Descartes is methodologies. That is, using the methodological doubts to achieve true knowledge<sup>48</sup>. His first step is to remove the conviction of the five senses. Because according to him, the senses often deceive and general truths recognized fact had the effect of fantasy and doubt<sup>49</sup>. In addition, the knowledge base is convincing ideas which he considered as a natural instinct in the sense of knowledge does not come from the senses and it not composed of will or desire, but from the power of thought that exist in human beings<sup>50</sup>.

Contrary to rationalism, the period after Descartes appeared stream called empiricism in England. According to empiricism, knowledge is not obtained a priori (preceding the experience), but as a posteriori (through experience). In addition to replacing traditional ways of thinking, empiricism trying to free themselves from all forms of spiritual speculation and tried to separate philosophy from theology<sup>51</sup>. Thomas Hobes (1588-1679) asserts that knowledge should be based on experience and observation. The next figure is John Locke (1632-1704) who had a theory of knowledge that comes from experience. He argues, before generating ideas, people through the process of sensing, such as observing the color, shape, smell or hear anything. Then proceed to the thought processes that generate ideas such as pain, pleasure and so on. This process is called simplex idea.

Empiricism increased in David Hume era (1711-1776) which saw traditional metaphysics uncertain, exalted human reason, mixed with Catholic dogma, political jargon and superstitions of the people. Therefore, Hume wants to

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<sup>48</sup>Lavine, T.Z, *Petualangan dari Socrates ke Satre*, Yogyakarta:Penerbit Jendela, 2002, p.83

<sup>49</sup>Ismail, Fuad dkk, *Cara Mudah Belajar Filsafat*, Jogjakarta:IRCiSoD, 2012, p. 72

<sup>50</sup>Ibid., p.78

<sup>51</sup>Hardiman, F. Budi, *Pemikiran-Pemikiran yang Membentuk Dunia Moder:Dari Machiavelli sampai Nietzsche*, Jakarta:Penerbit Erlangga, 2011, p.56

clean up the philosophy of religious symbols and metaphysical (secularization)<sup>52</sup>. Any ideas or concepts of human beings is nothing but a form of impressions (impressions) man himself. Thus, to prove the truth of the knowledge, the necessary field research, observation and experimentation, which means that the starting point of human knowledge<sup>53</sup>.

The difference between the two flow over increasingly in the 17th century and the 18th. After that, Immanuel Kant (1724-1804) formulated the criticism understood to mediate sense and sensory experience. Criticism is a way to verify various opinions and liberate ideas of confidence as the thoughts have not changed<sup>54</sup>. According to Kant, who can be known only what happened to the identifier<sup>55</sup>. Knowledge derived from a priori categories within reason (Verstand) are gaining in knowledge of sensory experience or knowledge (Anschauung)<sup>56</sup>. Then, knowledge as a result of the intellectual process has a relationship with the object through what he called a priori forms. Kant explains, in the subject can actually receive the data of the senses, he calls it a sensibility. Not only that, the subject was able to produce a concept of understanding, or in terms of Kant called by Verstand. Without sensibility, the object can not be entered into the subject, nor without reason, the object can not be contemplated<sup>57</sup>.

Influence of the ideas of rationalism and empiricism philosopher continues to understand the emergence of positivism. The role of this understanding is very important, considering the influence his thinking until now. The term positivism beginning introduced by Saint Simon and then spread by Auguste Comte<sup>58</sup>. Positivism rejects the whole notion of philosophical and theological and just put the natural sciences as a force to master the law of development. The law of development of nature is the only principle that is applied in the development of human life. Understand positivism indeed have triggered the birth of the positive

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<sup>52</sup>Ibid., p.75

<sup>53</sup>Murtiningsih, *Para Filsuf dari Plato sampai Ibnu Bajjah*, Jogjakarta:IRCiSoD, 2013, p.114

<sup>54</sup>Fuad Farid Ismail dkk, *Cara Mudah Belajar Filsafat (Barat dan Islam)*, Jogjakarta:IRCiSoD, 2012, p.113

<sup>55</sup>Verhaak S.J dan Imam Haryono, *Filsafat Ilmu Pengetahuan*, Jakarta:Gramedia, 1989, p.146

<sup>56</sup>Aholiab Watloly, *Tanggung Jawab Pengetahuan:Mempertimbangkan Epistemologi secara Kultural*, Yogyakarta:Pustaka Filsafat, 2007, p. 76

<sup>57</sup>T. Z Lavine, *Petualangan Filsafat dari Socrates ke Sartre*, Yogyakarta:Penerbit Jendela, 2002, p.120

<sup>58</sup>Aholiab Watloly, *Tanggung Jawab Pengetahuan:Mempertimbangkan Epistemologi secara Kultural*, Yogyakarta:Pustaka Filsafat, 2007, p.80

sciences (science). The culture of this understanding is respecting the physics of nature as the only experimental knowledge. Theology, philosophy or tradition is not recognized because it is considered not to have sufficient scientific weight. In fact, religion must be recognized by the law of positivism for human welfare.

Auguste Comte (1798-1857) describes the growth of knowledge will occur if the following three stages<sup>59</sup>. The first stage is the stage of theology (fiction). In this phase, the natural phenomenon is explained as the result of supernatural action. Second, the metaphysical stage. Natural phenomena interpreted as abstract notions as supernatural factors were replaced by an essentialistic abstract. And the third is a positive step. That is, the certainty based on science and positive law derived from science (experimental science). The views of positivism in Germany developed by Von Feurbach (1804-1872), a philosopher anti theology. Belief in God to him is an inhibitor of the progress of human life. And his view of God is nothing but the imagination of man's own self. For him, the notion of empiricism has taught the true certainty and it is the result of the senses (sensible). The thinking marks symptoms of a fundamental change from the old nature to the secular nature<sup>60</sup>.

## 5. Contemporary Period

Orientation in this era is the discipline of natural science and the understanding of the reality of growing. Not only that, any other characteristic that is the emergence of philosophy that is both realist understanding and the development of technological civilization as a result of the use of science. Advances in technology not ease the problems of human life, but it is exploitation and master nature. Degradation occurs due to humanitarian values and principles devastating world war and endanger the whole world creatures. Therefore, contemporary philosophers orient its study to investigate and explore human problems, how the course of his life, as well as criticism to humanity<sup>61</sup>. The theme of the twentieth century master was thinking language<sup>62</sup>. So not surprise if this era is commonly called logosentris times, because the text becomes the central theme of the discourse of the philosophers. Century cultural movement is mapped into

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<sup>59</sup>Ibid., p.81

<sup>60</sup>Ibid., p.82-83

<sup>61</sup>Fuad Farid Ismail dkk, *Cara Mudah Belajar Filsafat (Barat dan Islam)*, Jogjakarta:IRCiSoD), 2012,

<sup>62</sup>Bertens, K, *Filsafat Barat Abad XX: Inggris-Jerman*, Jakarta:Gramedia, 1983, p.17

two periods. The period before the end of World War II in 1945 and after World War II to the present. In the first period, positivism is still very powerful. The implication is science makes the only force in the struggle for renewal, cultural, political, state, law, and society<sup>63</sup>.

In addition, science or experimental science is increasingly becoming a prima donna and strengthened its position, so that God's supernatural displaced by scientism. There appear modern secularism and atheism as widespread phenomenon<sup>64</sup>. This period was marked by a shift from thinking with the law of development that is absolute to reorganize and reform in the development of science that are non-cumulative<sup>65</sup>. Thomas Khun explained, science plural paradigm is replaced by a single paradigm, where the man is the center. Not only that, the scientific revolution gave birth to the crisis of conflict and competition between science paradigm and the emergence of eccentric behavior with agitation techniques that are ekstrapolitic deployment time and extrainstitusional<sup>66</sup>.

After World War II, people want to freedom, freedom that is not deterministic by religion, theology, philosophy, science, and technology. For humans this time, there is no absolute truth and certainty. From this understanding, emerging schools of thought, such as phenomenology, existentialism, pragmatism. Epistemologically, phenomenology wants to build a directional intellectual reflection to the knowledge in the context of human experience<sup>67</sup>. Other important meaning that knowledge can be placed in the human experience in a dynamic and thorough and began associating with the knowledge of life and human life as context. Existentialism is an adequate flow effect after World War II. This understanding revolves around the human form of existence and all the problems of life. This flow does not require through debate against any entity, but only interested in *an sich* human existence<sup>68</sup>. The other side of this thinking comes

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<sup>63</sup>A.M.W Pranarka, *Epistemologi Dasar*, Jakarta:CSIS, 1985, p.156

<sup>64</sup>Aholiab Watloly, *Tanggung Jawab Pengetahuan: Mempertimbangkan Epistemologi secara Kultural*, Yogyakarta:Pustaka Filsafat, 2007, p.89

<sup>65</sup>Thomas Khun, *Peran Paradigma dalam Revolusi Sains*, trans. Tjun Surjaman, Bandung:Remaja Rosdakarya, 1993, p.91

<sup>66</sup>Ibid., p.92

<sup>67</sup>Aholiab Watloly *loc.cit.*, p.95

<sup>68</sup>Fuad Farid Ismail dan Mutawalli Abdul Hamid, *Cara Mudah Belajar Filsafat:Barat dan Islam*, Jogjakarta:IRCiSoD, 2012, p.146

down to the attitude of anarchy, total dissatisfaction, freedom without unity, and absurdity<sup>69</sup>.

Other characteristic of contemporary times is progression of civilisation and technology as the use of science. However, behind the rapid advancement of technology, the current industrialization became the sole factor in this day and age. As a result, it was found that a pluralistic civilization situation and then sweeping the world of humanity in a holistic manner. This is the direction of the evolution of contemporary history. Through science and technology, the future direction will likely designed 'relativize' and run over values, morality, spirituality, ethics, and human rights<sup>70</sup>. In addition, the emergence of the New Left movement led by Herbet Marcus (1898-1979) and neo-Marxism pioneered by Jurgen Habermas, triggering the growth of knowledge is ideological. New Left Movement wanted change without theoretical reflection and it is non establishment. While Neo-Marxism is more critical, both to communism, capitalism and socialism that has been organized. From this phenomenon, the need for fundamental epistemology arrangement to fix the confusion of thought and function of science, theology, philosophy and ideology. Thought arises to discuss communication between science, approaching and interdisciplinary structuring<sup>71</sup>.

### **C. The Relationship Between Religion And other Sciences**

#### **1. The Relationship Between Religion And Science According to Ian.G Barbour**

Until now, there are still many people who think that science and religion can not be unity. Both of them are separate, both in terms of formal-material objects, research methods, criteria of truth, the role played by scientists as well as the status of each theory even up to the event organizer. The history of science and religion has been starting since the advent rejection Heliocentric Theory of Galileo and Darwin Theory of Revolution by church leaders<sup>72</sup>. On the other hand, Isaac Newton and figures sciences secular put God merely as a cover while the aperture of difficulty (to

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<sup>69</sup>K. Bertens, *Filsafat Barat Abad XX: Inggris-Jerman*, Jakarta: Gramedia, 1983, p.312

<sup>70</sup>Aholiab Watloly, *Tanggung Jawab Pengetahuan: Mempertimbangkan Epistemologi secara Kultural*, Yogyakarta: Pustaka Filsafat, 2007, p.107

<sup>71</sup>Ibid., p.108

<sup>72</sup>M. Amin Abdullah dkk, *Menyatukan Kembali Ilmu-ilmu Agama dan Umum: Upaya Mempersatukan Epistemologi Islam dan Umum*, Yogyakarta: Sunan Kalijaga Press, 2003, p.03

fill gaps) unsolved and unanswered by the theory of their science, until they find a new theory and complete that can answer those difficulties<sup>73</sup>.

Regarding the tension between religion and science, many scientists who formed the theory of integration or fusion of them. Even it is not always use the word integration, integration discourse between science and religion in the modern Muslim explicitly has developed around the 1970s to the 1990s. In the context of Christian Contemporary, integration approach is popularized by Ian G. Barbour, who called one of the four typologies of science-religion relationship with "integration"<sup>74</sup>. Ian G. Barbour divides relationship between science and religion become four views: conflict, independence, dialogue and integration. Conflict means, science and religion are hostile<sup>75</sup>. This view emerged in the 19th century through two influential books, namely *History of the conflict between Religion and Science* by J.W. Draper and *A History of the warfare of Science and Theology in Christendom* by A.D. White<sup>76</sup>.

This first typology involves between scientific materialism and biblical literalism (fundamentalism). Barbour puts scientific materialism and biblical literalism in the relation of conflict-two view which is seem foreign to each other because scientific materialism believe that religious beliefs can not be accepted because religion is not a public data that can be tested by experiment and criteria like science. While biblical literalism see at science and religion are two opposing domains, so people have to choose one of them<sup>77</sup>. Armahedi Mahzar call this integration model as a model monadic totalistic. According to him, this approach is difficult to do as the basis for the integration of science and religion as both competitiveness negates the existence or truth of another<sup>78</sup>.

The second type of the Independence. Barbour explains the science and religion can be separated based on the problems studied, referenced domain and the methods used. This effort is not only to avoid conflict, but also to recognize the

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<sup>73</sup>Abdullah, M. Amin, *Islamic Studies Di Perguruan Tinggi: Pendekatan Integratif-Interkonektif*, Yogyakarta: Pustaka Pelajar, 2012, p. 93

<sup>74</sup>Zainal Abidin Bagir, *Integrasi Ilmu dan Agama: Interpretasi dan Aksi*, Bandung: Mizan, 2005, p.20

<sup>75</sup>Ian G. Barbour, *When Science Meets Religion*, (San Fransisco: Harpersan Fransisco, 2000), trans. *Menemukan Tuhan dalam Sains Kontemporer dan Agama*, Bandung: Mizan Pustaka, 2005, p. 30

<sup>76</sup>Watson, *Hubungan Sains dan Agama: Refleksi Filosofis atas Pemikiran Ian G. Barbour*, Jurnal Studi Islam Profetika, Vol. 15, No. 1, (Juni, 2013), p.80

<sup>77</sup>Ibid., p.81-82

<sup>78</sup>Zainal Abidin Bagir dkk, *Integrasi Ilmu dan Agama: Interpretasi dan Aksi*, Bandung: Mizan, 2005, p.95

different characteristics of each area of life and thought. In two different domains, science and religion is really going according to their respective functions. Science is built based on observation and human experience, while religion-be it faith, God or religious beliefs-depends entirely on the will of God and not to the discovery of human beings like science<sup>79</sup>. Science serves to question how something works by relying on public data that objective. As for religion, asking about values and frameworks of meaning for human life<sup>80</sup>.

If independency stressing on the differences, Barbour offered a third way, it is Dialog. Typology of dialog consider presuppositions in scientific, exploring the parallels between the methods of science and religion, and analyze concepts in one field with another<sup>81</sup>. As statement of Thomas Khun in his book *The Structure of Scientific Revolutions* that theory and data depending on the paradigm. Paradigm is a pre-supposition conceptual, metaphysical and methodological in the scientific work carried out by the scientific community. Through the new paradigm, the new data will be found by way of reinterpreting the old data in new ways. In short, Barbour explained the conceptual and methodological parallels which offers the possibility of meaningful dialogue between science and religion while maintaining the integrity of each.

The last type is the integration of which is divided into three parts. First, the natural theology (natural theology). In natural theology, there is the claim that God's existence can be inferred (or supported by) the evidence about the design of nature that makes us more aware of it<sup>82</sup>. In other words, human hopes to find a proof (or at least hint) that will steer the existence of God. Natural theology considered to have a strong appeal in the realm of multi religion because it derives from scientific data to produce an agreement between the various cultures and religions. This concept was deemed more consistent with personal admiration and awe felt by scientists in their scientific work<sup>83</sup>. In addition, natural theology was supposed to provide a way out between science and religion because he can explain God-in the language of the Designer-Barbour simple.

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<sup>79</sup>Ian G. Barbour, *Juru Bicara Tuhan:Antara Sains dan Agama*, Bandung:Mizan,2002, p.65-66

<sup>80</sup>Ian G. Barbour, *Menemukan Tuhan dalam Sains Kontemporer dan Agama*, Bandung:Mizan, 2005, p.31-32

<sup>81</sup>Ian G. Barbour, *op.cit.*, p.74

<sup>82</sup>Ibid., p.82-83

<sup>83</sup>Ibid., p.88

The second is *theology of nature*, the main source of theology come from outside science, but scientific theories can also give a strong impact on the reformulation of certain doctrines, particularly the doctrine of creation and human nature. This concept argues, some of the traditional doctrine must be redefined in the context of modern science. Arthur Peacocke, a biochemist and theologian wants to redefine the traditional beliefs to respond to contemporary science. Because according to him, God created the universe creation process is revealed by the science<sup>84</sup>.

The third part is a synthesis of systematic, science and religion are contributing to the development of inclusive metaphysics, such as philosophy of process. in philosophy of process, the arrangement of reality is the type of event that has two aspects or two phases instead of two types of entities eternal (dualism mind / matter) or one kind of eternal entities (materialism)<sup>85</sup>. The third part of this, it can be concluded that the sciences are separate from the spiritual values and ethical in some cases forbidden even for the future of mankind and the universe. The sciences of this kind must be packed with religious values and spiritual that these sciences can bring benefit for humans and the universe<sup>86</sup>. In integrative relationship, both science and religion are equally aware of the existence of a greater insight includes both so that it can cooperate actively. In fact, science can increase confidence religious community by providing scientific evidence on revelation or mystical experience<sup>87</sup>

## **2. An Integrated-Interconnected Paradigm of Science According to M. Amin Abdullah**

The development of technology and science, including the development of the social sciences is so rapid humanitarian relatively close distance of the cultural differences of the region with other regions. This will have an impact on human consciousness to what is called the "religious phenomenon". Religion in the present era can not be understood and approached only through theological-normative approach solely<sup>88</sup>. If the relationship between religion and science is patterned conflict or independence, the inconvenience to live will be perceived by the world community.

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<sup>84</sup>Ian G. Barbour, *Juru Bicara Tuhan:Antara Sains dan Agama*, Bandung:Mizan, 2002, p.90

<sup>85</sup>Ibid., p.95

<sup>86</sup>Zainal Abidin Bagir, *Integrasi Ilmu dan Agama:Interpretasi dan Aksi*, Bandung:Mizan, 2005, p.210

<sup>87</sup>Armahedi Mahzar, *Revolusi Integralisme Islam:Merumuskan Paradigma Sains dan Teknologi Islami*, Bandung:Mizan, 2004, p.213

<sup>88</sup>M. Amin Abdullah, *Studi Agama:Normativitas atau Historisitas?*, Yogyakarta:Pustaka Pelajar, 2004, p.09

Ideally, the relationship among them is dialogue and even better if in the form of integration<sup>89</sup>. As an example, the religious sciences such as theology/creed that is not accompanied by sociology and anthropology, will make faith a person becomes uncomfortable when coexist with other people of different religions and beliefs. The social sciences must be balanced with the religious sciences in order not to bring *maḍarat* or risk unpredictable.

Therefore, Amin Abdullah provide theoretical relationship between religion and science in this case *Ulumu al-ddīn* (religious sciences of Islam) and science, both science faulty, social and cultural patterns necessitates a relationship that is dialogical, integrative-interconnective<sup>90</sup>. If the religious science is only used one discipline approach, the understanding and interpretation of religion will lose contact and relevance to the relationship around. Culture is being built by Amin Abdullah today is able to articulate the subjective side, objective and intersubjective of science and diversity of contemporary multicultural era. Theoretically, Amin Abdullah inspired from Ian. G. Barbour and Holmes Rolston III theory, that there are three key words that describe the relationship of science and religion patterned dialogue and integration, such as *semipermeable*, *Intersubjective testability* and *Creative Imagination*.

The semipermeable concept is derived from the biological sciences, where the issue of survival for the fittest is the most prominent. The relationship between “causality”-based science and religion is based on the notion that the “meaning” is semipermeably patterned, i.e. between the two are penetrating (conflicts between scientific and religious interpretations arise because the boundary between causality and meaning is semipermeable). The relationship between science and religion is not separated by thick walls such that it is not possible to communicate, but is one of mutual penetrability and permeability. They partially penetrate each other, rather than being free and isolated. There is still a line demarcating the disciplines, but the scientists of different disciplines can communicate, be open with each other and accept input from disciplines outside their field. This mutually penetrating relationship can be clarificative, complementative, affirmative, corrective,

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<sup>89</sup><https://aminabd.files.wordpress.com/2013/10/agama-ilmu-dan-budaya.pdf> Taken at 18 April 2016

<sup>90</sup><https://aminabd.files.wordpress.com/2013/10/agama-ilmu-dan-budaya.pdf> Taken at 18 April 2016

verificative, and also transformative<sup>91</sup>. Amin Abdullah described the relationship patterns of scientific disciplines of religious and non-religious metamorphosis similar to the "spider web of science", where among various disiplin science-actively interact dynamically. The style of the relationship between scientific disciplines and methods are patterned integrative-interconnective<sup>92</sup>. The approach which combines the revelation of God with the findings of the human mind is not going to turn down the role of God (secularization) or isolate the role of man so alienated from him, society and the environment<sup>93</sup>.

Second, intersubjective testability. The term comes from Ian G. Barbour on how the faulty science and humanities, but Amin Abdullah developed his own theory with religious phenomenology approach. For Barbour between subject and object, each of which plays a role in a study. Data can not be separated from visual observers, because the situation on the ground has always intervened by scientists themselves. Therefore, nature does not give the concept itself, but scientists participate in developing the concept as a creative thinker. Therefore, the so-called objective, should be enhanced by intersubjective testability, that is when all of the scientific community together to participate to test the level of truth and meaning interpretation of data obtained by researchers and scientists from the field<sup>94</sup>. Amin Abdullah adopt an idea of Joseph A. Braken in his book titled Subjectivity, Objectivity and Intersubjectivity, which states that there are seven elements in religion that according to observers is objective universal. However, these results when interpreted by religious followers, will be transformed into an objective understanding and experiences for their sociological process.

The study of religion can not be equated with scientific research faulty or national science as in religion, there are elements that unleaveable, namely involvement (full engagement) and unreserved commitment (commitment that can not be bargained)<sup>95</sup>. After identifying the struggle between the objective world and the subjective one in the study of religion, which can be formulated into *objective-cum-*

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<sup>91</sup><https://aminabd.files.wordpress.com/2013/10/agama-ilmu-dan-budaya.pdf> , taken at 18 April 2016

<sup>92</sup>M. Amin Abdullah, *Islamic Studies di Perguruan Tinggi: Pendekatan Integratif-interkoneksi*, Yogyakarta: Pustaka Pelajar, 2006, p. 107.

<sup>93</sup>Siswanto, "Perspektif Amin Abdullah tentang Integrasi Interkoneksi dalam Kajian Islam" dalam, *Teosofi* vol. 3, (Desember 2013), p.378

<sup>94</sup>Ian. G. Barbour, *Juru Bicara Tuhan:Antara Sains dan Agama*, Bandung:Mizan, 2002, p.183

<sup>95</sup><https://aminabd.files.wordpress.com/2013/10/agama-ilmu-dan-budaya.pdf>, Taken at 18 April 2016

*subjective* and or *subjective-cum objective*, then the next cluster of thought, which is “intersubjective” will be more easily understood. “Intersubjectivity” is the mental position of scientists (scientific mentality) that enables them to intelligently bring the subjective and the objective worlds into dialogue in the face of the complexities of life, in the spheres of science, religion, and culture. Intersubjectivity is not only be found in the area of religion, but also in the world of science in general. The community of researchers always works within the framework of intersubjective testability. Life is too complex to be analyzed by only one discipline. Overspecialization and linearity of science are hotly discussed and debated nowadays and collaboration between the various disciplines is necessary to solve a wide range of problems. Input and criticism from various disciplines (multidisciplinary approaches) and across-disciplines (transdisciplinary) are essential to be able to understand the complexities and bring about a better life. Linearity science, conceived in an *ad hoc* way, will narrow one’s scientific insight when faced with scientific issues beyond the limited reach of a specific scientific field<sup>96</sup>.

The third step is the Creative Imagination. Koesler and Ghiselin suggest that the creative imagination in science and literature is often related to efforts to coordinate two different concepts into one framework<sup>97</sup>. There is synthesis between two different things to form a new unity, a rearrangement of the elements of the old configuration into new configurations. Although it is often a new theory emerged from a combination of two things that actually have nothing to do at all. According to Amin Abdullah, it is time now to use imagination and creativity in the learning process of the lecture. Religious sciences such as jurisprudence, worship, *kalām*/*‘aqīdah/tawhīd*, *tafsīr*, *ḥadīth*, history and morality, should no longer be sterile from encounters, intersections and struggles with other disciplines. Not the time for religious sciences should be losed of contacts and interventions of social science, faulty, and vice versa by integrating the social sciences systematically<sup>98</sup>.

Furthermore, Teachers and lecturers need to think creatively, and dare to associate with each other, to create dialogue in the field of science in relation to religion and other scientific disciplines. If this step is not done, then religious

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<sup>96</sup>Ibid., p.17-18

<sup>97</sup>M. Amin Abdullah, *op. cit.*, p.18

<sup>98</sup>M. Amin Abdullah, dkk, *Islamic Studies dalam Paradigma Integrasi-Interkoneksi*, Yogyakarta: Suka Press, 2007, p. 33.

instruction in schools, let alone universities, will gradually lose its relevance. To the issues surrounding the increasingly complex<sup>99</sup>. Amin adopt an idea of Abdullah Abid al-Jabiry:

"It is an accident of history of Muslims, when the building scholarly natural sciences (*al-'ulūm al-kawniyyah*) became separated and not in contact at all with the Islamic sciences whose foundation is essentially a" text "or *naş*. Although the classical Islamic civilization never carve his history with the names of known mastering the natural sciences, such as Al-Biruni (d. 1041) an encyclopedic Muslim philosopher Ibn Sina and medical experts, Ibn Haitham (d.1039) a physicists, etc. Unfortunately, Islamic colleges which are now less known him or maybe did not know him anymore, especially the development of the natural sciences methodology that is now developing, which in fact can be utilized for the development of Islamic sciences that exist today<sup>100</sup>."

Integration-interkonetif paradigm actually want to show that different disciplines have a relationship or connection, as shooting from all disciplines is the reality of the universe, only the dimensions and the focus of attention of the respective disciplines of different viewpoints. Therefore, superiority, exclusivity, dichotomous election to the scientific field in question, it will only harm themselves, both psychologically and scientifically-academic<sup>101</sup>. Amin Abdullah provide concrete examples of the Scientific objectification of Islam is Islamic Economics, where his theory along with practice comes from God's revelation. In this case, Islam presents ethics in economic behavior, such as profit sharing (*al-muḍārabah*) and cooperation (*al-mushārah*). From this experience the objectification of science Islam, where religious ethics be useful, both for Muslims and non-Muslims. For the future, the scientific work patterns integralistic with religious morality humanistic base are required to enter a wider area, such as psychology, sociology, anthropology, health, technology, economics, politics, international relations, law and justice<sup>102</sup>.

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<sup>99</sup>M. Amin Abdullah, *op.cit.*, p. 20

<sup>100</sup>M. Amin Abdullah, dkk, *Islamic Studies dalam Paradigma Integrasi-Interkoneksi*, Yogyakarta: Suka Press, 2007, p.27

<sup>101</sup>Ibid., p.viii

<sup>102</sup>Ibid., p.105

#### D. Unity of Sciences

Paradigm of unity of sciences departs from the realization that there are three crises in modern science, namely the crisis in science *naqliyah*, *'aqliyah* and the crisis in the local wisdom. To answer the crisis of modern science, the paradigm of the unity of science is formed by implementing three strategies at the same time, the humanization of science for *naqliyah*, spiritualized in *aqliyah* sciences as well as the revitalization of local wisdom for the local genius<sup>103</sup>. The discourse of unity of sciences has been replaced by an interdisciplinary research and of course has its own history and logic. It can be traced from the concept of pre-Socratic Greek cosmology, particularly in the event which is the one, and the many. Starting from the many different views of the philosophers of the world's existence, resulting in the emergence of differences in the problems of epistemology. Plato defines knowledge is one, all of the existing diversity is part of that one and was given a special name accordingly. The end result is the existence of various forms of knowledge. Discourse unity of science continues until the Renaissance. Francis Bacon argued the sense of unity of science is the result of the organizational pyramid-shaped material facts to the various levels of generalization, which are then grouped according to the disciplines related to the ability of the man himself<sup>104</sup>. Ramon Lull looked unity of science is determined by a set of rules into an element of analysis and synthesis of ideas in combination.

During the Enlightenment Era in Europe, the discourse of unity of science is strong confidence. This belief is further strengthened by the analysis of Immanuel Kant that assesses one of the functions is as a unifying philosophy and values of the various sciences. The unity of science according to Kant lies in the unification of the character or function of the concept and the reason the union itself, and not a reflection of the unity that is found in nature. Discourse unity of science into logical empiricism typical themes of philosophy in the 20th century. The positivistic logic and founder of the Vienna Circle adopt a unified science without metaphysics, which is a union based on the demarcation between science and metaphysics. That is, there is a unity of method and language that scope includes all sciences, natural and

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<sup>103</sup>Muhyar Fanani, *Paradigma Kesatuan Ilmu Pengetahuan*, Penelitian Individual:CV. Karya Abadi Jaya, 2015, p.49

<sup>104</sup>Abdul Muhayya, *Konsep Wahdat al-Ulum menurut Imam Al-Ghazali*, Penelitian Individual, Semarang:IAIN Walisongo, 2014, p.31

social<sup>105</sup>. The paradigm of the unity of sciences does not deny that there is a science that can not be integrated. As examples of the science of science that are difficult to discussed with the Islamic sciences.

Paradigm studied in terms of ontological unity (whatness) is the science of the whole of reality, both metaphysical and physical; both text Qur'aniyah and text *kawniyyah*. The implication is not the object of science dichotomy between the metaphysical and the physical, as well as the lack of knowledge about the dichotomy between text Qur'aniyah or *kawniyyah*. From the ontological dimension (howness), knowledge comes from two sources, there are from God and from human, either through the senses, reason, or intuition. There is no dichotomy of methodology in understanding reality. Dimensions of the ontological unity of science accept methodological plurality in getting science. While the dimensions axiology (whyness), there are two orientation values, such as values of divinity and humanity. Therefore, the development of science, in terms Axiological rejected the notion of value-free science or views of only the value orientation of humanity or the divinity alone<sup>106</sup>.

There are some principles to establishing the paradigm of the unity of sciences. First is integration. Integration believes that all knowledge is a unity that comes from the verses of Allah, both obtained from the prophets (revelation), exploration of consciousness or nature. Second is collaboration of universal values of Islam with modern science to advance human civilization and quality of life. Third is the dialectic. This principle is trying to articulate between the sciences that come from revelation (revealed sciences), modern sciences and local wisdom. The fourth principle that is prospective. With a prospective way, the paradigm of the unity of science is believed to produce the new sciences of the humanist and ethical and beneficial to the development of dignity and quality of the nation and the preservation of nature. The final principle that pluralistic believes plurality reality, methods and approaches in all scientific activities. Additionally, the approach used by this paradigm is Theo-anthropocentric. This approach is intended that the reviewer is

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<sup>105</sup>Ibid., p.35

<sup>106</sup>Muhyar Fanani, *Paradigma Kesatuan Ilmu Pengetahuan*, Penelitian Individual:CV. Karya Abadi Jaya, 2015, p.53-54

always God as the origin and destination of all the scientific work and without leaving the role of human beings who have a scientific instruction<sup>107</sup>.

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<sup>107</sup> Ibid., p.54-55