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THE FOUNDATION OF SCIENCE AND TECHNOLOGY IN VIEW OF MUHAMMAD ABDUH

Ahmad N. Amir, Abdi O. Shuriye, Ahmad F. Ismail

Kulliyyah of Engineering,
International Islamic University
MALAYSIA.

ABSTRACT

This paper highlighted the prominence of Muhammad 'Abduh in science and technology and his contributions in developing scientific methodologies and principles. It discovered his ideas on science, technology, reason, revelation and rationality. It is important to note that Abduhu's intention was to espouse universal framework of Islamic science. His scientific ideas were clearly presented in his works such as TafsirJuz 'Amma, (Commentaries of Juz 'Ammah) Tafsir al-Manar (Al-Manar Commentaries) and his masterpieces Al-Islam wa al-Nasraniyahma'a al-Ilmwa al-Madaniyyah (Islam and Christianity in Relation to Science and Civilization) and Risalat al-Tawhid (The Theology of Unity). This worldview was projected fundamentally and centered on his effort to harmonize reason and revelation and finding new ground for Islamic science to be revived and revitalized. Many argue that his contributions to Islamic science were monumental in recognizing the dynamic interaction of revelation and reason and bringing progressive and rational understanding of the scripture which successfully accommodated the power of intellect and reason in modern times.

Keywords: Muhammad Abduh, Islamic science, scientific exegesis, technology, Islamic reform

INTRODUCTION

The impact of science and technology in modern times is profoundly expanded. The greatest works of science were produced by Muslim scholars in medieval times contributed to vigorous scientific progress with stunned creativity and discovery in various branches of scientific fields. The glorious times of al-Andalus has produced precise and powerful tradition of scientific enterprise and genuine achievements of knowledge and ideas. This paper analyzed the historical foundation of science and technology, its origin and basic structures and its relation to Islamic worldview. It further analyzed the contribution of Shaykh Muhammad Abduh, and his role in gearing scientific breakthrough in al-Azhar and the Arab world at large, and the proliferation of science and technology in the Muslim world, contributing to scientific advance and revitalizing the aspirations and monumental project of Islamization of science in contemporary times.

THE NATURE SCIENCE

The term 'science' is derived from latin verb '*scire*' meaning 'to know' (Neufeldt, 1994). From this verb it formed the noun '*scientia*' which later developed as 'science'. Science has a long defined history from the time of classical Greek to the renaissance of scientific era in medieval Islam. The history of science is usually viewed as the progressive accumulation of techniques and the refinement of quantitative methods in the study of nature (SeyyedHossein Nasr, 1968).In

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his classical work on the ranks of the sciences (*Maratib al-'Ilm*), IbnHazm classified science in his time to seven divisions.

He says: "the sciences (*al-'ulum*) prevailing today are divided into seven divisions among all nations, in all places and at all times. These are: the religious law (*'ilmshari'ah*) of every nation (*ummah*) for every nation must have some doctrines, whether they are established truths (*athbat*) of falsehoods (*abtal*), and the science of the annals (*akhbar*) of a nation and the science of its language (*lughah*). Nations are distinctive with respect to these three sciences. As for the remaining four sciences they are common to all nations, and these are: philosophy (*al-falsafah*),…metaphysics (*ilahiyyah*), astronomy (*al-hay'ah*) and medicine (*al-tibb*)" (Chejne, 1982). Science is defined as a body of knowledge and a system of analysis and research. It is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe (J.L. Heilbron, 2003). Science also can be formulated as "a process for man to obtain knowledge." (Nik Mustapha, 2003, 164).

Modern science is a discovery as well as invention, with essential features and characters such as rational, universal, objective, tangible, and empirical. Scientific knowledge thus rests on the bedrock of empirical testability. The main function of science is to establish scientific laws and theories in an effort to explain, predict, understand and control a particular natural phenomenon (Hunt, 1991). The main field of science includes geography, physics, mathematics, chemistry, botany, biology, zoology, geology, mineralogy, economics, law, sociology and philosophy (John ObertVoll, n.d.), (Mawdudi, n.d.).

SCIENCE IN ISLAM

Islamic science referred to those sciences developed by Muslims from the second Islamic century onward. Traditional Islamic science was an independent way of studying the nature of phenomena, causality, the relationship between various forms of objects from minerals to plants to animals, the meaning of change and development in the world of nature and the final end and goal of nature. (SeyyedHossein Nasr, 1993). According to Golshani, Islamic science is a "science that is framed within an Islamic worldview and whose main characteristics are that it considers Allah as the Creator and Sustainer of the universe, does not limit the universe to the material world…and accepts a moral order for the universe." (Golshani, 2000).Zaghlul al-Najjar define Islamic science as "knowledge gained through divine revelation, by human thinking, creative intellect and through human legacy and tradition". (al-Najjar, R. Zaghlul, 1981). In studying the distinctive aspect of Islamic science Hossein Nasr compare the secular and Islamic construct of science and explain that "Islamic sciences always relate to the existence of God and His authoritative power, whereas for the modern sciences, God is irrelevant to sciences." (Nasr, 1981: 13). Islamic science was characterized by unity, harmony, reality and hierarchy.

Islam encouraged the pursuit of knowledge and science, and this was clearly illustrated by almost 750 verses in the Qur'an, (about one-eighth of the Qur'an) exhorting the believers to study nature (Ishfaq Ahmad, 2003). Many verses in the Qur'an instigated human mind to ponder, reflect, think and make sense of the world and the universe and to explore and investigate natural world from atoms to galaxies. Studying science is considered an act of worship, and obedience to God's command to seek knowledge and wisdom. (Khalid A.S. al-Khateeb, n.d.).

THE RISE OF SCIENCE IN MEDIEVAL ISLAM

The advancement of Islamic science flourished during the Abbasid reign in Baghdad with phenomenal achievement in scientific enterprise making its greatest contribution to the construction of Muslim civilization. The time of Umayyad and Abbasid rule in Baghdad and al-Andalus saw the thriving of culture and scientific works unmatched in its creativity, genuinity and universality and profoundly impact the dynamic life of medieval world. This was accentuated by Prof. A. Mottaleb in his important remark on the interaction of culture and knowledge: "(with) the rise of Islam, one of the wonders of the world brought fundamental changes in faith, philosophy, politics, economics, arts and above all science and everything that is needed for civilized living for which there is no second example on earth. The wisdom of the other people were taken and the man educated in previous traditions when became Muslim used their formal learning with the Qur'anic philosophy. Their contributions went into the general stream of Islamic thought and thus an autonomous Islamic culture and science took shape." (Mottaleb, n.d.)

Medieval time is undoubtedly the glorious century of Islam where massive works of Greek philosophy was translated and analyzed. This monumental effort has been instrumental in the thriving of ideas and proliferation of technology in Islamic world, as clearly assented by Sarton in his analysis of formidable history of Islam and its classical works: "During the reign of Caliph al-Ma'mun (813-33 A.D.), the new learning reached its climax. The monarch created in Baghdad a regular school for translation. It was equipped with a library, one the translators there was HunaynibnIshaq (909-77), a particularly gifted philosopher and physician of wide erudition." (Sarton, 1931).

The scientific works of Muslim scholars had profoundly influenced the modern world and making great stride to scientific renaissance in Europe as mentioned by Robert Briffault: "It was under the influence of the Arabs and Moorish revival of culture and not in the 15th century, that a real renaissance took place. Spain, not Italy, was the cradle of the rebirth of Europe…it had reached the darkest depths of ignorance and degradation…when cities of the Saracenic world, Baghdad, Cairo, Cordova, and Toledo, were growing centers of civilization and intellectual activity." (Briffault, 1928). The decisive influence of Islamic culture has been instrumental for the thriving of dynamic ideas and the making of greatest innovation and progress and the development of Islamic science. The technological advance and powerful discovery of Muslim scholars had lasting influence on the development of modern technology and contemporary science. Magnificent works in sciences has brought scientific and technological prowess to Muslim world with stunning contribution in empirical discovery and scientific experiment. Muslim scholars have produced classical and masterful work in nearly every branch of knowledge which surpassed its times in its creativity and originality in very broad disciplines. The work undertaken by these scholars ignited the scientific renaissance in the west and the transferring of ideas and civilization of Islam to Europe. According to Briffault: "The experimental method of Arabs was by (Roger) Bacon's time widespread and eagerly cultivated throughout Europe. Science is the most momentous contribution of Arab civilization to the modern world...which constitutes the permanent distinctive force of the modern world, and supreme source of its victory, natural science and the scientific spirit" (Briffault, 1928).

Medieval Islam made genuine contribution to world civilization by producing brilliant scientist and scholars of Islam such as al-Biruni, al-Kindi, al-Khawarizmi, al-Farghani, al-Razi,

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ThabitibnQurra, Jabir ibnHayyan, al-Idrisi, al-Battani, HunaynibnIshaq, Ibrahim ibnSinan, al-Jazari, al-Farabi, al-Zahrawi, al-Mas'udi, IbnSina, al-Tabari, AbulWafa, Ali ibn Abbas, IbnYunus, al-Kashi, ibn al-Haitham, Ali ibn Isa al-Ghazali, al-Zarqab, and Omar Khayyam whose works was strikingly genuine and was hailed as the principal reference in the west for centuries, and this was clearly mentioned by Prof SeyyedHossein Nasr in his works, *Science and Civilization in Islam*: "The Muslims…whose strange bent for the "subtleties" of algebra and logic somehow enabled them to become the transmitters of Greek learning to the West…a culture whose spiritual values are inextricably tied up with mathematics and with metaphysics of a high order, and which once again fused the constituent elements of Greek science into a powerful unitary conception, which had an essential influence on the Western world up to the time of the Renaissance."(Nasr, 1968)

In this exposition, SeyyedHossein Nasr has established the foundation of Islamic science and technology which is based on tawhid and knowledge. The impact of Islamic world to the West and European science was profound, and it was the great learning of Muslims in science and technology that has produced the civilization of knowledge in the entire world. The Arabic-Islamic science has solidly flowered and matured during the eight century Umayyad rule and establish the greatest culture and civilization in al-Andalus. Nasr says: "it is those very elements of the Islamic sciences, most responsible for providing the tools with which the West began the study of the already secularized nature of the seventeenth century, that became secondary in the Islamic world itself and had already ceased to occupy the main intellectual efforts of that civilization by the ninth/ fifteenth century." (Nasr, 1968).

George Sarton, a reputed scholar in medieval history, distinctively hailed this magnificent achievement of Muslim scholars in his work, where he claimed: "it will suffice here to evoke a few glorious names without contemporary equivalents in the West: Jabir IbnHayyan, al-Kindi, al-Khawarizmi…a magnificent array of names which would not be difficult to extend. If anyone tells you that the middle ages were scientifically sterile, just quote these men to him, all of whom flourished within a short period, 750-1100 AD." (Sarton, 1931).

DECLINE OF ISLAMIC SCIENCE

The decline of Islamic science occurred after sixteenth century due to many internal and external factors which affect its stagnation and sterile, especially the high handed action of "suppressing even the genuine use of all rational tools of development, the stagnancy and closure of the doors of rational and analytical genius of Muslim scholars and scientists." (DilnawazSiddiqui, 2005). Other factors contributed to the decline in science and technology is internal faction and clash between Mu'tazilites and Asha'arites, the siege of Baghdad by Mongols in 1258, expulsion from Spain in 1492 and the end of Caliphate in 1922, and the march of foreign ideology such as communism, capitalism and colonialism. The decline of Muslim empire in the late Abbasid, was lamented by al-Mas'udi in his great travelogue: "the same accord in recognizing that all traces of science have vanished and that its splendor is spent; learning has become too general and has lost its depth, and one no longer sees any but people filled with vanity and ignorance, imperfect scholars who are content with superficial ideas and do not recognized the truth." (Mas'udi, 2007).

Since the reformation era in Europe, Muslim has continuously failed to regain passed glory and to restore the dynamic role and recover their mighty power at the global stage. With the transfer of Islamic science to the west the secular world developed monumental feat in scientific work

ignited the thriving of renaissance and the flourishing of scientific revolution and advancement in Europe. This modern progress of the west in science and technology was gained from the transfer of Islamic civilization to the west where the scientific and technological based in the Muslim world has completely lost and defeated. According to Briffault: "it is highly probable that but for the Arabs, modern European civilization would never have arisen at all; it is absolutely certain that but for them, it would not have assumed that character which has enabled it to transcend all previous phases of evolution." (Briffault, 1928)

To reclaim the superior position and power, Muslim should embrace the critical ideas of science and the technology they once developed and synthesis it with current development in the West. Development of science must be based on the holistic teaching of Islam and its true character which invite genuine speculation and rational thinking (*nazar*,*fikr*), contemplating on the status of man as creation of God, for "all development efforts which do not take into account man's status and obligations as the servant of Allah are bound to fail, with great consequences in this world and in al-akhirah." (Muhammad Kamal Hassan, 1982).

The need to regain scientific and technological prowess was crucial in modern times, which according to Prof. Dr. Kamal Hassan, was timely because "Muslim must reclaim and recapture the dynamic and scientific achievement of past scholars, in order to restore its position and mastery over every branches of knowledge." (Muhammad Kamal Hassan, 1985).

Muslim ummah must have a strong position in the modern civilization and technological world. The truth that emerged from scientific discovery must be pursued and encouraged, and this was aptly idealized by Abdul KarimSoroush in his book, *Reason, Freedom and Democracy in Islam*: "Truths everywhere are compatible; no truth clashes with any other truth. They are all the inhabitants of the same mansion and the stars of the same constellation. One truth in one corner of the world has to be harmonious and compatible with all truths elsewhere, or else it is not a truth." (AbdolKarimSoroush, 2001).

RISE OF MODERN SCIENCE

After the age of enlightenment in Europe, science has been developed as the cornerstone of modern society and cherished as the bedrock of civilization. The rise of modern science began to take place in the fourteenth to eighteenth centuries A.D. rooted back from the rise of Europe in the age of enlightenment. The enormous contribution of modern science has produced unprecedented ideas and cultural vigor projecting for new scientific worldview with great ramification which still reverberate and resonates throughout the world. The triumph of modern science was defended and justified by most of Christian Arab thinkers as being illuminated in periodicals such as *al-Hilal* and *al-Muqtataf* (1860 – 1900 edition) (Charles D. Smith, 1983). According to Butterfield, scientific revolution that began around 1300 "outshines everything since the rise of Christianity and reduces the renaissance and the reformation to the rank of mere episodes, mere internal displacements, within the system of Medieval Christendom" (Butterfield, 1958).

In modern times, science makes profound influence in nearly every branches of knowledge and in every single direction of life. Muslim has been benefiting conclusively from the advancement of science since classical times, and they need to appreciate the contribution of science and technology to contemporary life. The scientific discovery was instrumental in the progress of modern orientation towards scientific life. Modern science placed great emphasis on the idea of

reason and objectivity, faith and civilization, metaphysics, epistemology and empirical studies of nature and producing unique synthesis of religion and philosophy which placed great emphasis on scientific methodology, and the importance of systematic observation, experimentation and theory building. Later half of the nineteenth century saw the resurgence of Islam in the new century and the march of science and technology in the Muslim world and the rise of Muslim modernists advocating modern aspiration and the acceptance of modern science such as Sayyid Ahmad Khan (1817-1898), Jamal al-Din al-Afghani, Muhammad Abduh, Rashid Rida, TahaHussayn, Muhammad HusaynHaykal, and Qasim Amin. Their political and literary influence was enormous, seeking to liberate Muslim from rigidity and making universal and inclusive appeal to merge with modern science and knowledge.

There is clashes of ideas between the necessity to learn and identified the secular knowledge and to discard every element propagated by the west. In his profound analysis of the catastrophes of modern science SeyyedHussin Nasr says: "Modern science wants to study the whole of creation while abstracting the Divine Principle from it. Of course, modern science is now breaking up and we might have another paradigm in the future, but the paradigm that has dominated from the seventeenth century until now is one in which the effect is studied without the Supreme Cause. No matter how much you study the cosmos you never run into the Supreme Cause because it is excluded by definition from the modern scientific view…you end up with the secularization of knowledge, which leads to the catastrophes which humanity is faced with today." (SeyyedHossein Nasr, 1968). Hunt has formulated four features which characterized modern science, (1) rapid growth of knowledge, (2) growth of knowledge across many different areas, including medicine, biology, anatomy, electricity, mechanics, astronomy, (3) scientists built upon the works of their predecessors rather than starting from scratch (4) knowledge built through critical discussion based on logic and observation (Hunt, 1991). The formulation crafted by Hunt reflected the time when scientific explosion was at its zenith in the Muslim world.

TECHNOLOGY IN ISLAM

The word technology is derived from Greek *techne* meaning art or craft, and it encompasses an enormous range of human activities. It consciously intended to improve the quality of human life in the material realm. Technology also blends into science, which oriented toward the betterment of life, and the custom and folklore in human practices that are grounded in conscious efforts to improve the quality of life. Technology has little direct connections with Islam as a religion, compared to scientific endeavors, which has sometimes directly relate to Islamic doctrines. "Islamic technology" is defines as the set of arts and crafts that impart a distinctive atmosphere to the predominantly Muslim societies of the Middle East and North Africa. (Karen Pinto, n.d.) Technologies have contributed strongly to qualities of life in the pre modern and postmodern Islamic world. Technological advance in Muslim world have exposed them to culture, philosophies, religious, political and economic relationship with other nation and community. The transfer of Islamic technology to the west, in the sixteenth century, is the turning point of the decline in scientific undertaking in Islamic engineering and chemical industries.

Technology is part and parcel of Islamic ideals, referring to the verses "God taught man all what man knows," which include science and technology (Khalid al-Khateeb, n.d.). In his analysis of Islamic technology, Professor Khalid A. S. al-Khateeb justify his finding on the need of Muslim world to utilize technological instrument and scientific apparatus by emphasizing the need to

develop human resource in science and technology to face the challenge of globalization: "From an Islamic point of view; if the aim is to build a world civilization based on moral values, such that globalization is 'human oriented', it is a good thing. But if it is 'profit oriented' aimed at propagating western values, which are based on the supremacy of the European race, the Muslim ummah must proceed carefully. Concerted efforts and calculated steps should be taken towards the development of human resources in science and technology." (Khalid al-Khateeb, n.d.: iv). Maryam Jameelah in her work claims that "science and technology are totally dependent upon the set of ideals and values cherished by its members." (Maryam Jameelah, 1983: 8), hence pious society whose life rooted in strong religious and ethical conviction could have crafted its scientific and technological endeavor in line with religious precept.

ABDUH'S PHILOSOPHY OF SCIENCE

Abduh's categorically supported the pillars of science and the rational foundation of religion. He speaks of intellectual basis of science and religion which embrace reason (*'aql*), revelation (*wahy*), knowledge (*'ilm*), rationalism and justice (*al-'adl*). Abduh sees no bifurcation between religion and reason and emphatically maintain that science is a friend of religion and they do not come into conflict. This was clearly espoused by Einstein: "religion without science is blind, science without religion is lame." Abduh insists on transformative approach towards religion especially on certain aspects that fall into the realms of *al-mutaghaiyyirat* (the changing), which demand for perceptive and rational thinking to be endorsed. He distinguished between the immutable (*al-thawabit*) and the changing (*al-mutaghaiyyirat*), the principles and the models, which advocate the essence of absolute and eternal principles of shariah and the realities and specific requirements and conditions of the Muslim ummah. The underlying principle of his ideas is to galvanize the forces of science and freedom and undertake dynamic reform in religion and civilization to adequately answer contemporary challenges.

Abduh's rationalism was substantively influenced by Afghani who publicly championed western science in a major way. He undertakes reform that would transform the society and open the ways for the mind and ideas to be flourished and advocating the free spirit of rational inquiry. In pursuing the reform agenda, he devises a system between faith and modernity and made a synthesis between modern ideas and religious tradition to prove the viability of Islam's prescriptions in the modern age. He positively advocates the principles of justice, equality, rights and liberty and the need to produce dynamic society, and productive civilization capable of meeting the challenge of modernity.

The rational philosophy he advocates was based on the premises that no differences exist between science and religion, and that both science and religion are rooted in reason, and that the Qur'an urges man to use his reason (Livingston, 1995). According to him, reason is Islam's strongest support, and Muslim must recapture the substance, spirit and objectives of the shariah and genuinely realized its practice to modern principle of *mu'amalah* (social affairs). Abduh has grounded dynamic Islamic theology in his work *Risalat al-Tauhid* (*The Theology of Unity*) which comes parallel to reformist thought of al-Afghani, and through which he attempt to reconcile between conscience and science, uphold the supremacy of religion, emphasizing the need of *ijtihad* (independent thinking) in pursuing his reform agenda, reforming and adapting Islam's ethical and legal percept to the practice of modernity, promoting rational thinking and advancing the cause of science and technology in modern life, and encouraging rationality, creativity and integration of science and religion. He takes an ecumenical and balance position in

his struggle to accommodate science with religion, in contrast with the radicals and secularists, who uncritically adopt western norms and assimilate absolute modernity and "pursued science and modernization strongly without any particular regard to religion" (Gibb, 1952).

Abduh's rational theory was fundamentally based on the *tawhidic* pillar and firm religious ground and principle by which he insists that is imperative for Islamic science to build new dimension of universal ethics and values of Islamic world views and cultures in shaping the scientific philosophy of Islamic science. Abduh insists that the means of development must be acquired through knowledge (Muhammad Ammarah, 1972). This comprehensive philosophy of science clearly accommodates reason and rational thinking as part of his philosophy of Islamic science.

Abduh tried to bring scientific views and modern ideas in his interpretation of the text, while reviving the spirit of ijtihad, and reconciling Islamic ideas with western thought, suggesting ideas like *maslaha* (interest) in Islamic thought corresponded to *manfa'ah* (utility) in western ideals, equated the system of *shura*with democracy, and*ijma'* with consensus. According to him: "the concept of ijtihad should be revived, emerging priorities and problems, which are new to the Islamic thought, need to be addressed." (Fadzli Adam, 2003).

His method of thinking consists of literal and contextual comprehension of the text with definitive focus on rational understanding of the text, as indicated by Malcolm Kerr in his study of Abduh political ideas: "One of 'Abduh's most constantly stressed themes in his theological and apologetic writings is the essential harmony of reason, revelation and individual moral temperament." (Malcolm H. Kerr, 1966). According to him, the basic foundation of religion is rationality and its guiding idea is freedom and conviction. In his *Risalah al-Tawhid* he mentioned that: "The Muslims are agreed that if religion can reveal certain things to us that exceed our comprehension, it cannot teach us anything that is in contradiction with our reason" (Kenneth Cragg, 1966).

Abduh certainly condemned the rigidity and blind acceptance of religious authority (*taqlid*) and call for fresh interpretation and independence investigation of the text, dismantling and debunked prior interpretation and obsolete tradition. He argue that certain problems of rigidity (*jumud*) was due to accumulated custom and habit of superimposed on true moral instinct (*al-wijdan al-sadiq*), artificially raising numerous conflict with reason. There is no antagonism between the two so long as moral instinct is freely expressed and reasons stay within its proper bound (Malcom H. Kerr, 1966). He clarified that: "Complete religion is knowledge and taste, heart and mind, evidence and acknowledgement, thought and temperament. Wherever there appears to be conflict between reason and temperament it is only because what is thought to be one or the other is really something" (Abduh, *Al-Islam wa'lNasraniyya*, Malcom H. Kerr, 1966).

Abduh categorically supported the doctrine that science is the twin of religion, encouraging the spirit of enquiry and cultivating religious sciences and techniques based on the power of reason and intellectual freedom: "I spoke on behalf of two great causes. The first of these was the liberation of thought from the chains of imitation and the understanding of religious faith as the members of the early community understood it before dissension arose, and the return of religious learning to its original sources, and consideration of religion in the scales of human intelligence that God created to repel the excesses of faith and diminish its errors and stumbling, so that the human social order prescribed by God in his wisdom may be attained. In this way religion may be counted the true friend of science, a stimulus for enquiry into the secrets of the

universe, and an appeal to respect established truths and rely upon them in cultivating our spirits and reforming our actions. Secondly, I have considered to be a single matter. In appealing on its behalf I found myself in opposition to the views of the two great groups of which the community is composed: the devotees of the religious sciences and others of their type and the devotees of modern techniques and their partisans." (Rida, *Tarikh*, Malcom H. Kerr, 1966).

Abduh had positive views on science which he convincingly says that: "Science was a way of life rooted in freedom and progress; in its pure form, science, when properly married to religion, brings society to fulfillment. Without freedom, science cannot exist, quite as without justice, freedom and progress cannot exist. Freedom implies justice as science implies freedom (Abduh, *Al-Ahram*, 1880, John W. Livingston, 1995). For Abduh, science has close relation with reason (*'aql*), and religion with moral consciousness (*wijdan*). Both give fulfillment to the human being in that they are mutually complementary. They will never oppose or contradict each other, and they are one in the human soul. He consistently mentioned that "both science and religion are rooted in reason, and that the Qur'an urges man to use his reason (John W. Livingston, 1995). Abduh's scientific ideas found resonate in the works of scholars like IbnKhaldun as clearly seen from his writing in *Al-Ahram*, which parallel to IbnKhaldun's view, that: "Justice is the only soil in which science can take root. Science implies economic prosperity, cultural efflorescence." (John W. Livingston, 1995).

Abduh's writing has been instrumental in uncovering the nature of science and the workings of the cosmos, natural law, and bringing scientific and technological advances to the Muslim world. This was accentuate and justified by Said Nuris in his *Damascus Sermon* and *Risale-iNur*: "that science's breathtaking discoveries of the universe's functioning corroborate and reinforce the truths of religion." "therefore, in the future when reason, science and technology prevail, of a certainty that will be a time the Qur'an will gain ascendancy, which relies on rational proofs and invites the reason to confirms its pronouncements." (Bediuzzaman Said Nursi, 1996).

Abduhs' Contributions to Science and Technology

Abduh's creative contribution to science and technology can be gauged from his pragmatic view on the essence of scientific education, in which he says: "without the spread of education in modern sciences, that nation will be far behind other nations leaving, both identity and welfare in danger of disintegration" (Khoury, 1976). One aspect of his contribution is harmonizing science with revealed scripture. 'Abduh's immense contribution to science can be deciphered from his major accomplishment and excellence achievement in science and philosophy throughout his career. He attempted to synthesized knowledge acquired through rational human efforts and through the Qur'an which is seen as complementary to each other. For him, both are 'signs of God' that enable humanity to study and understand natureand insisted on the co-existence on science and revelation. Abduh combined naturalist and traditionalist approach in his movement which emphasized on conviction with respect to faith and scripture. With historical Islam thus marginalized, Abduh embarked on reinterpreting the Qur'an in the light of modern science, and the argument of reason, as fundamental criterion to prove the contemporary relevance of Islam as religion of ease, tolerance and conforming to the condition of human life. (Aziz al-Azmeh, 1996). This was consolidated by Maurice Bucaille in his study of modern science and the Qur'an that: "the relationship between the Qur'an and science…turns out to be one of harmony and not of discord (Bucaille, 1989).

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Another aspect was Abduh's courageous effort to introduce scientific subjects in al-Azhar and schools in Egypt which had a primary impact on scores of scholars in Egypt and raised the status of science, which also stimulated the proliferation of science and scientific learning in the Muslim world. Abduh often backed his appeal for scientific education on ground of religious virtues, which place special important on knowledge for the appreciation and observance of God's message (Khoury, 1976). The drive and fortitude for reform has motivated many young modernist to support his ideals, such as Ali Abdul Raziq in Egypt and Sir Sayyid Ahmad Khan in India who proclaimed the need to adapt secular and western science: "Let the Muslims study western knowledge and modern science, as what their forefathers did to Greek philosophy" (Sayyid Ahmad Khan, 1967: 97). The principle aim of Muhammad Abduh in introducing scientific subjects was to inculcate scientific worldviews, liberalizing ideas, and finding pragmatic approach to learning. His effort and pronouncement has been followed by TahaHusayn who criticize the obsolete tradition of al-Azhar institution: "al-Azhar will fail unless the culture that it propagates throughout the Islamic world is attuned to the personality of the modern Muslim moulded nowadays by secular education and modern life" (TahaHusayn, 1954).

The third aspect could be said,Abduh's scholastic views of placing reason on superior position as well as highlighting the importance of logic and *ijtihad* in religious pursuit, and maintaining that religion should be approach with logic and proof (Khoury, 1976). This position was illustrated by Malcolm Kerr in his study of Abduh's reform initiative: "thus reason can discover the existence of God and identify His most important qualities, but cannot determine the correct forms of worship; revelation prescribed all the details of the law of inheritance, but omits mention of the details of governmental organization.(Malcolm Kerr, 107). The supremacy of science and reason was asserted in many occasions in his works. In the compilation of his work (*A'malKamilah*) he insisted that "in Islam, it is reason that is addressed" (Ammarah, 1972). His approach to the study of nature attempted to synthesis reason and revelation, and knowledge and values. In his article on "philosophy and the call for modern science" Abduh expressed his astonishment on Muslims who refused to teach logic: "If this is our attitude towards such subjects…I dread to think of how we regard the new sciences which have became everyday necessities and the bases of happiness, wealth and power in our modern era…we must go about acquiring these things in the proper manner following the lead of those of our own people who would have us be cognizant of our need for those sciences and of the danger of our ignoring them." (Ammarah, 1972). His ideas found resonate in the scores of modern scholars who proclaim the same magnitude of thought, highlighting Islam as a religion of reason and nature, and the fundamental important of logic as wisdom (*hikmah*) bestowed by God indispensable for scientific thinking. The doctrine he preached and the worldview he projected find resonate in the word of Jose Rizal, the great martyr and humanist par excellence who says: "humanity will not be redeemed while reason is not free" and Shah Waliyullah (1702-1763) who asserted that religion when backed by reason carries conviction and fortifies wavering faith (Nik Mustapha, 2003).

Apart from the aforementioned, Abduh, endeavored to Islamized science and technology, by attempting to construct and craft an Islamic framework of science by focusing the role of reason and intellect in Islam. He managed to justify legitimacy of science and technology and rectify the framework of science from Islamic perspective. He defended the role of science in enabling reform of social life and synthesized the concept and understanding of science with the genuine ground of framework of Islamic science and technology. His effort to Islamized foreign science

and restructure it to suit Islamic ideals was perfectly stated by KhouryAbdo: "The most important issue that concerned Abduh is the reinstatement of Islamic values". (Khoury, 1976).

CONCLUSION

This paper brought four new understanding and exploration of Abduh's scientific views which; he professed with strong idealism advocating harmonizing and synthesis science with scripture. The fundamental ideas he brought are the unbending relation of science, freedom and revelation, which is paramount for scientific enterprise to flourish and thrive. The scientific ideas developed were crafted within the framework of Islamic and scientific tradition, which clearly resolved to effect change and reform in the Muslim land. He projected unprecedented reform in scientific undertaking and presented clear analysis of science, reason (*'aql*), and revelation (*wahy*) with new perspective to develop and galvanize scientific spirit and its dynamic role in the Muslim world. This essay has undertaken to highlight his position on science and the essence of reform agenda he pursued gearing towards creating religious consciousness and driving the force of modernity and progress, defending the supremacy of reason and rational, and assuring the triumphant of science and technology. Our role in this century is to uphold his ideas and aspiration for scientific reform and revival and significantly embark on Islamizing science and technology based on his scientific thinking and worldview. We must develop his aspiration to revitalize and reconcile religion and science, and construct greater effort to uncover the dynamic role of science and renew its spirit and reclaim the supremacy and powerful position of Islamic science in contemporary ummah.

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