TOWARDS THE ASSIMILATION OF ISLAMIC VALUES IN SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENTS

Dr. Iqbal J. Unus
President
Association of Muslim Scientists & Engineers
Plainfield, Indiana, U.S.A.

Abstract

To appropriately study the assimilation of Islamic values in scientific and technological development, one must define scientific and technological development, establish the relevance of Islamic values and identify the process of assimilation.

Development is a multi-faceted process. Scientific and technological development is one face of this process, relating to the ability of a society to apply scientific discoveries and technological innovations to raise the based human activity. The tenets of Muslim, or Islamic science, differ from those of the non-Muslim or non-Islamic science. The resulting scientific and technological development is both a product of the underlying values as well as a determinant of what values shall prevail in the society undergoing that process.

Islam lays down a purpose for a Muslim life, establishes a system that governs it and defines relationships that are guided by the 'purpose' and circumscribed by the 'system'. Nothing, much less scientific and technological development, can fall outside these guidelines — for Islam is life itself.

The concepts of Tawheed, Khilafah and Ibadah and the principles of universalism, tolerance, respect for knowledge and the unity of ummah are among the pillars on which the edifice of Islamic science rests. They form the Islamic values which must be inculcated in contemporary science if it is to play a role in rejuvenating the great Islamic civilization. Since scientific and technological development in the Muslim world cannot be halted and overhauled, a continuous and deliberate process of assimilation of Islamic values in scientific and technological development is called for. This must be accomplished on a long-term basis through Islamization of the entire educational process, and on a short-term basis through determined reshaping of the planning and policy-making processes in the Muslim world.

Above all, before the assimilation of Islamic values in scientific and technological development can take place, Islam itself must command the total loyalty and commitment of the Muslim society. With that commitment

the process of assimilation will yield a well-woven fabric of development. Without that commitment, the result will be patchwork of discordant elements ready to be torn to pieces by any serious challenge to its validity.

Introduction

The subject-matter of my paper is the assimilation of Islamic values in scientific and technological development. This qualified somewhat by the assumption that this presentation is intended to refer to the Muslim world only. Furthermore, for obvious reasons, I'll not discuss the state or the inadequacies of development in different parts of the Muslim world, or how to address the problems associated with them. I must, however, briefly define science, technology and development from my point of view in order to put the theme in the right perspective. Following these necessary definitions, I'll discuss the relevance of Islamic values to scientific and technological development. The main thrust of the paper will then follow, as the title implies, in the area of assimilation of Islamic values.

So let's first deal with what we mean by 'science', 'technology' and 'development'.

Definitions

Science: "Science" is an understanding by man of his environment, achieved through observation, contemplation, and inspiration within the framework of his own views of his environment and his relationship to it. Contrary to popular belief, science and scientific knowledge exist only in relation to the value system that characterises the scientific community. In a sense, science is what is developed and cultivated by using the scientific method, including the creative process which enabled Ibn-Sina or Einstein to accomplish what they did accomplish in the context of science in their own days and environment and their own value systems. This creative process ferments in the scientist's mind and relates to his own world view. (Nasr-1980)

Technology: "Technology" is the application of scientific knowledge to the production and distribution of goods that fulfil man's needs in the areas of food, agriculture, industry, housing, communication, health, education, etc. Various forms of technology may spring from the same scientific principles. All such forms must necessarily be influenced by and relfect the environment in which they were developed. When transplanted into a different environment, their products must necessarily perturb the societal fabric. To truly benefit its potential users, technology must be produced and developed in an environment in which the users operate most efficiently and happily.

Development; "Development" is the capacity of a people to convert their natural resources into consumables required to satisfy basic human needs like food, clothes, shelter, medicines, weapons, etc. Notwithstanding the mysterious sophistication of meaning acquired by the term "development", a developing society is one that is striving to acquire means and methods which may enable it to satisfactorily feed, cover, shelter, cure and defend its people at the highest level of satisfaction consistent with the most prudent utilization of available and potential resources. Once this goal has been achieved, this society may be classified as developed (with a reservation that we will momentarily discuss), even if it cannot send a man to the moon or achieve an industrial growth rate of X%.

The reservation that we speak of is related to the purpose of being, that of life itself. Were man created only so that he may feed, clothe, shelter, cure and defend himself, development would simply be a matter of acquiring and managing the needed resources. The end-all and be-all of life would be to become strong enough to wrest the resources and clever enough to exploit them. That, indeed, is the end-all and be-all of the 'unbelieving' nations of the world today. The believers, Muslims, know better, insha'Allah. The words of Allah ring clear: "I have not created jinns and men except to worship Me." (51:56)

Our lives will have meanings and acceptance for Allah (s.w.t.) only when there is a correspondence between our actions and the purpose of our being created. The definition of development must be qualified to reflect this purpose. A Muslim society may be considered developed only when its ability to feed, clothe, shelter, cure and defend itself is established and excercised within the context of the worship of — i.e. obedience to — Allah (s.w.t.). In practical terms a Muslim society is commanded to seek the hereafter without neglecting the present world, to seek Allah's bounty while remembering Him, to distinguish between good and bad, to share Allah's wealth and to interact with one another in mutual respect and agreement. The Qur'an formulates this context in the following verses:

"And seek to attain by means of what Allah has given you, the abode of the Hereafter, but neglect not your share in this world, and do good to others as Allah has done good to you, and seek not to make mischief in the world. Surely, Allah loves not the mischief-makers." (28:77)

"When the prayer is ended then disperse in the land and seek of Allah's bounty but remember Allah much so that you may be successful." (62:10)

"Say: the bad and the good are not equal, though the abundance of the bad may fascinate you; so keep your duty to Allah, O men of understanding, that you may succeed." (V:100) "And give them of the wealth of Allah which He has given you." (24:33)

"O you who have faith! Devour not the property of anyone of your wrongfully, except that it be trading by your mutual consent." (4:29)

Thus a Muslim society that internally suffers from social injustice,

economic imbalance, or other forms of disobedience to Allah cannot, by definition, be called a developed society even if it attains a growth rate of X% or can send space ships to the end of the universe.

There is yet another dimension to 'development'. Muslims are one, not by choice or accident, but by divine design. They have been created as such and any weakness of this unity is tantamount to 'malfunction'. The Prophet (peace be upon him) has said: "In mutual compassion, love and kindness you will find the faithful like a body, so that if one part feels pain, the whole body responds with wakefulness and fever." (Bukhari V.8, p. 12 and Muslim V.4 p. 1999)

Muslims are like 'parts of a body'. To speak of the Muslim World as being developed in one part and underdeveloped in another is like calling a man healthy when his heart is fine but his lungs are diseased, or vice versa. From Upper Volta which has one hospital bed for every 60,000 persons to Kuwait, which has one bed for every 1,000 persons, and from Turkey, where daily nutritional intake is 98 calories, to Bangladesh, where it is 40 calories, the Muslim world must function as one close family. It must also function as one giant economic unit, demanding an integrated approach in the assessment and development of its resources to achieve a balanced and just degree of satisfaction of basic human needs.

Role of Muslim professionals in scientific and technological development

Having defined development as a process through which the Muslim society progresses towards higher levels of fulfilment of its true and ordained nature, we must now seek out those qualities that must characterise the Muslim professional who propels this process. We contend that the process proceeds within the context of a purpose and a system in which actions or products have defined relationships and standards.

Purpose: The purpose of a Muslim's life is the Pleasure of Allah (s.w.t.). "Say: Truly, my prayer and my service of sacrifice my life and my death, are all for Allah, the Cherisher of the Worlds." (3:19)

System: The system that a Muslim is governed by is that of Islam. "The Religion before Allah is Islam (submission to His Will)."

Relationships: The relationships among actions or products are multidimensional. Guided by the 'purpose' and circumscribed by the 'system', these relationships touch on all aspects of human life, as examplified in the following injunctions:

"And when the prayer is finished, then may ye disperse through the land, and seek of the Bounty of Allah: and celebrate the Praises of Allah often (and without stint) that you may prosper. (62:10)

"Say: not equal are things that are bad and things that are good, even though the abundance of the bad may dazzle thee; So fear Allah, O ye that unders-

tand; That (so) ye may prosper." (5:100)

"Allah intends every facility for you. He does not want to put you to difficulties." (2:185)

"Allah has made beneficence obligatory upon you." (Muslim: Vol. 3, 1548:57)

Responsibilities: The Muslim professional must, therefore, exert his best efforts in carrying out his assigned task under the following guidelines:

(a) He must search industriously for the bounties Allah has provided for his sustenance, be these natural resources to explore or new processes to utilize available resources. While he does that, he must remember Allah (S.W.T.) so that he does not lose sight of the purpose of is effort. There is no room for a professional who just gets by with enough to earn a livelihood or who exerts more but only to earn more of the same livelihood.

(b) He must endeavour to make life easier, be that through innovative for work, be it the search for a new drug or the development of an industrial complex. There is no room for a professional who ignores this distinction under the false pretense of 'search for truth.'

(c) He must to make life easier, be that through innovative research or through ingenious applications of available knowledge.

(d) In all his endeavour, he must exert maximum efforts and strive for optimum results.

Comparing the Muslim professional with his non-Muslim counterpart, Maulana Maudoodi writes: "A Muslim Scientist on the other hand, will behave in an altogether different way. The deeper his insight into the world of science, the stronger will be his faith in Allah. His head will bow down before Him in gratitude. His feelings will be that as his Master has blessed him with greater power and knowledge so he must exert himself for his own good and for the food of humanity. Instead of arrogance there will be humility. Instead of power-drunkenness there will be strong realization to serve humanity. His freedom will not be unbridled. He will be guided by the events of morality and Divine Revelation. Thus, Science would, in his hands, instead of becoming an instrument of destruction, become an agency for human welfare and moral regeneration. And this is the way in which he will express his gratitude to his Master for gifts and blessings He bestowed upon man." (Maudoodi-1960)

Relevance of Islamic values

In the work 'Islamization of Knowledge' al-Faruqi has analysed the essence of Islamic values. We quote the main points from that work here:

Tawheed, the unity of Allah (S.W.T.) is the first principle of Islam and of everything Islamic. Creation in an integral whole precisely

because it is the work of one Creator Whose order and design has infused every part of it. Allah ta'ala created everything and did so with precise measure (25:2). Everything has a purpose. Allah ta'ala has granted the world as a temporary gift and theater to man. And has made everything in it subservient to him. The whole range of nature is capable of receiving man's efficacy, of suffering change at his initiative, of transformation into any pattern man desires. Allah knows the truth and what He conveys in the revelation cannot be different from reality, since He is the Creator of all reality as well as of all truth. Islam affirms with all possible emphasis that man has a raison d'etre and is the service of Allah ta'ala. The divine will is of two kinds, the first that is realized necessarily, and that is the divine pattern on the basis of which creation runs. The second kind is realized only in freedom, only when they are fulfilled in a condition where both fulfilment and violation or non-fulfilment are distinct possibilities. These are moral laws. They co-exist with the laws of nature. Man's carrying of the divine amanah constitutes his khilafah or vicegerency to God. His khilafah consists in the fulfilment of the moral laws. Islam does not separate the sacred or religious from the secular. In its view, there is one reality only, not two. The content of the divine amanah, and therefore of khilafah, is the development and establishment of culture and civilization. To institute peace and assurance of life and property, to organize humans into an ordered society capable of producing food, of processing, storing and distributing it to all in adequate quantities and quality, to provide shelter, warmth and comfort, communication and ease, to build and make available the tools necessary to realize these goals and, finally, to furnish opportunities for education and self-realization, for recreation and esthetic enjoyment, this is the core content of khilafah. Every Muslim must feel secure in his life, property, personal honour, and place in society. To fulfil this requirement is a first Islamic societal imperative. The will of Islam to culture and civilization is comprehensive. This comprehensiveness is at the foundation of the comprehensiveness of the shari'ah. All humans are one and the same: the base ground of Islam's universalism. All humans are one in Allah's eye except as their deeds distinguish them in moral virtue, in cultural or civilizational achievement. (al-Faruqi-1982)

Primary Values: Some Muslim and Western scholars of science have rightly argued that contemporary realisation of Islamic science must be based on a framework of values that are the basic characteristics of the Islamic culture. They have identified these values as: tawheed (unity), khilafah (trusteeship), ibadah (worship), ilm (knowledge), halal (praise-worthy) and haram (blameworthy), adl (social justice), zulm (tyranny), istislah (public interest)and dhiya (waste). This system of values embraces the nature of scientific inquiry in its totality leading to a system of knowledge that is based on accountability and social responsibility. (IWI-1982)

The paradigms of Islamic science, according to them, are the concepts of tawheed, khilafah and ibadah. Within these paradigms, Islamic science operates through the agency of ilm to promote adl and istislah. Thus the accountability of a Muslim scientist is both social and spiritual. A natural science that develops within this framework would also promote Allah-consciousness, harmonise the means and ends in the production of knowledge and emphasise social relevance in both the pursuit and the application of knowledge. (Sardar-1982)

Secondary Values: These fundamental Islamic values (or concepts) lead to a set of secondary values (or principles) directly related to the process and content of scientific and technological development, namely: universalism, tolerance, respect for knowledge and unity of the ummah. (Kettani-1982) These are discussed here briefly.

universalism: The universalism of Islam is best expressed by the Qur'anic declaration to the Prophet Muhammad (peace and bleassings of Allah be upon him) that "We have sent you but as a mercy for all the worlds". That the message of Islam, as personified in the character of the Prophet, is not restricted to any one nation or area, leads to the breaking down of all barriers between people. This concept of universalism of Islam in the past led to an unhindered and uninhibited movement of scholars and ideas among people enabling Muslim scholars to benefit, and be benefited by, the most advanced centers of learning at the time.

tolerance: The Qur'an calls the Muslims an 'ummatan wasata' i.e. a moderate people, a people not given to extremes in their views and conduct. This concept at the individual level calls for acceptance of errors as a human trait — thus paving way for vigorous experimentation and research without any prejudgements. Extremism, on the other hand, has a vested interest in either maintaining a status quo or in taking uncalculated and, often irrational, leaps into the unknown — hardly a formula for progress.

respect for knowledge: The Prophet (p.b.u.h) described a person who went out in search of knowledge as one who was in the Path of Allah until he returned. Innumerable injunctions of the Qur'an and the Hadith make both the seeker and the carrier of knowledge objects of respect and admiration. Thus, in the Islamic system, knowledge itself becomes a pivotal commodity in the society's search for the fulfilment of its role.

unity of the ummah: The Qur'an declares the Muslim ummah to be 'ummatan wahidah', one indivisible body governed by the shariah of Islam in all aspects of its life. As a united body, it is a super-market of ideas and goods where the economics of scale make possible the most efficient production and dissemination of products. Divided into many pseudo-nations, its output suffers from duplication, redundancy and unsatisfactory cost-to-benefit ratios.

Process of Assimilation

We now address the central theme of this presentation: How can Islamic values be assimilated in scientific and technological development? To answer this question, we must ask another. What determines the style of development in a given situation?

On a relatively short term basis the pace and style of development is the result of national policy.

Policy determines how resources — be they human or material — will be used to achieve predetermined goals. These goals are themselves defined by policy. Science and technology policy, in particular, determines how, if at all, the expertise and the creative urge of scientists and engineers may be directed to food self-sufficiency through the production and preservation of food, to public health through sanitation and the prevention of disease, to material benefit through industrial production and efficient marketing, to national security through resource development and defence research, and so on. Even at the risk of being considered too simplistic, one may venture to say that 'good' policy can yield remarkable results from limited human and material resources, while 'bad' policy can effectively limit the potential benefits of virtually unlimited human and material resources.

There is no doubt that on the contemporary technical scene, Muslims have their share of qualified and creative scholars, researchers and innovators. Given the tools of their trade, they can produce as high a quality of science, engineering and technology as any other peoples — in a certain environment. Of late, that environment has been shaped by the ideological, socio-cultural and moral tenents of the western world — a world whose lifestyle is more alien to the Muslim world than many like to admit. Thus, the challenge for the Muslim scientists and engineers is not merely to be productive in the Muslim world. The real challenge is: Can Muslim scientists and engineers be productive in an environment created by an Islamic lifestyle? Or, must they import and implant western mores and norms in the Muslim world in order to raise it to higher levels of progress and prosperity? In the latter case, the new world they build will not be our world and we would have lost what we presently have without gaining what we seek.

In this particular sense, Muslim scientists and engineers will not be prepared to play their rightful role in the contemporary Muslim resurgence until they have formulated an Islamic framework for science and technology and learned to operate within that framework. The Muslim world needs them to relieve itself of hunger, sickness and poverty. It needs them to develop its resources, to build its agriculture and industry, to establish its prosperity — but NOT to obliterate its identity.

Those seeking a role in the development of the Muslim world can obtain little encouragement from recent history and the failure of most Muslim countries to develop a science and technology policy which would make even a dent in the towering walls of poverty, disease and hunger that imprison our people. Leaving aside the oil-rich zones, the common indices of economic well-being elsewhere in the Muslim World have generally gone down. Unrest and lack of personal safety have increased. Spiralling price increase un-matched by any significant increase in purchasing power have kept people struggling for subsistence today and wondering about its availability tomorrow. Would a different type of science policy improve their lot? Is their malaise the result of neo-colonialist pressures from the advanced Western countries? Would self-reliance help them to develop their national economies?

While no one answer may be correct in all circumstances, one sees a lack of national direction and resolve as an underlying weakness. In one Muslim country after another, governments which do not represent their subjects, which appear and disappear at the behest of forces that have no roots in the people, lay down policies and plans for progress and prosperity. However good they may be on paper, such policies and plans never catch national imagination or command national loyalty. They remain the pet obsessions of governors, change suddenly with every sudden change of government and, consequently, are never able to mobilise the genius of the Muslim people. In such an environment, the Muslim scientists and engineers remain by-standers. (Unus-1980)

On a relatively longer term basis, the pace and nature of development is the result of the education and training process itself. Since the human being is the primary contributor to the development process, his goals and values, his loyalties and commitments, his inspiration and aspiration, his understanding of the international economic forces or the lack of it, shape and sustain the style of development. Through appropriate education and training, in their widest sense, scientists, engineers and other professionals can be equipped for the task of the assimilation of Islamic values in scientific and technological development.

We shall now discuss, in somewhat more detail, policy-making and education as vehicles of change in the Muslim world.

Policy

"Policy" is a set of major decisions governing the direction of subordinate decisions such that a pre-determined desirable, overall objective will be achieved through the cumulative result of these numerous, interdependent subordinate decisions. The purpose of formulating a science and technology policy is to achieve certain objectives which must conform to the overall goal of the society of men governed by that policy. The main objective has been stated as follows by the United Nations Conference on Science, Technology & Development: "To improve the quality of life of the citizen and to provide for all fellowmen a life of joy and creativity, embracing

physical, mental, moral and spiritual well-being and values" (UNCSTAD-1979).

Since policy determines the allocation of national resources to the conduct of scientific and technological activity, the objective indicated above is constrained by the absolute need to survive in the event of a current or anticipated war. In such an event the consumption of resources is generally of lesser concern than the practicality of plans. (Naqvi & Unus-1979)

Furthermore, for Muslims, as should be for all humanity, all actions must lead to one supreme end — the Pleasure of Allah i.e. obedience to His Command. Besides, all Muslims constitute one ummah of brothers in faith, not necessarily by choice but absolutely by divine injunction. This is so, notwithstanding the colonial brainwashing that has split the world of the Muslim ummah into miserable pieces of real-estate whose elitist leadership is often physically and emotionally more attached to London, Paris or Washington than to their brothers across artificial borders. The Qur'an is explicit in its injunction about the unity of the Muslim ummah and its responsibility to worship Him. "Verily you are one Ummah, and I am your Lord, so worship Me." (21:92) Thus policy must be further constrained by the Will of Allah and the brotherhood of men.

"The first problem common to all developing nations is the weak policy foundation for scientific and technological development and concomitant development strategies" (Choi-1975). There is no recent tradition of policy-making in Muslim countries, especially such as would successfully operate within the complex and constrained environment of modern technology. Among other difficulties (Unus-1981; Ali-1981; Naqvi-1979):

(a) There is an insufficient number of active consensus-forming groups (professional societies) to feed valuable input into the policy-making deliberations of the governmental agencies, or vice-versa.

(b) The channel of communication between the decision-making apparatus of the government and the various affected sectors of the society, like industry, farming and research, are often clogged and sometimes non-existent.

(c) There is an inability to properly mobilize the sources of influence in favour of meaningful and relevant formulation of science and technology policy.

(d) There is inadequate correspondence between national needs and goals on the one hand, and the nation's policy and planning on the other.

(e) By definition, the developing countries do not have any "cushion" of resources or time, and any error in their performance, even though based on an inadequate infrastructure, can be intolerable.

A study of western Asian countries shows that "none of the central planning machineries has a unit dealing with science and technology....national plans do not include separate chapters dealing with the application of science

and technology to development or building of the national and scientific potential". (ECWA-1978). There are a few exceptions, though, and the situation is somewhat better in certain Muslim countries like Pakistan and Egypt. However, the general conclusion remains that the foundations of S & T policy-making are weak, if not non-existent, in the Muslim world.

The Environment of Policy-making.

Science and technology policy cannot — must not — be formulated in a vacuum. Science and technology, in themselves, are not the end but only means to reach what the beneficiaries consider to be their goal in being what they are. It could be a mundane goal like the "pursuit of happiness" or it could be an ordained goal like "seeking the Pleasure of Allah, S.W.T. In any discussion of science and technology policy, we must assume — at least, hope — that the societal goal is clearly known and agreed upon. If the goal itself is fuzzy, no amount of sophistication in policy-making will help.

"Science and Technology policies should be formulated within a broad context of national socio-economic development strategies" (Kim & Sagasti-1975). It follows then that in Muslim societies, science and technology policy must be integrated with Islamic socio-economic objectives and policy (IFSTAD-1980). It must seek productive utilization of human and material resources to promote, among other things, social justice and public interest. It must delineate priorities in research and development and establish a functioning scientific and technological information system. It must aim at fulfilling basic human needs and must seek autonomous technological capacity to do so.

Science and technology policy must be both need-oriented and mission-oriented. For example, the policy should aim at decentralizing small-scale industry to fulfil the basic human needs of the predominently rural population that is so typical in the Muslim world. At the same time it must provide the maximum possible impetus for the establishment of Ma'roof (good) (IFSTAD-1980).

Sciene and its subsequent metamorphosis into technology were once activities confined to individual initiative and creativity. The results of scientific research were sought for their own sake, and then percolated to the society at large at a slow pace. Consequently a great deal of time elapsed before scientific discovery led to inventions for social use. For example, 112 years passed between the discovery of scientific principles of photography and their commercial exploitation (1727-1829) while the integrated circuit (IC) took only three years (1958-1961) to become widely used in commercially available devices. The change of pace is obvious.

This rapid integration of science, and technology, into society has put

greater premium on the society's ability to harness this new force to its advantage.

The Elements of S & T Policy

"(Science and Technology) policy consists of a political will, and commitment for development of science and technology as expressed in public statements by the highest decision making organ.....They express a purpose.....and may set objectives and define desired outcomes, and may establish quantitative goals. The policy also contains criteria for choosing among alternatives with regard to the performance of science and technology function and activities, thus providing guidance for decision-making": (Ali-1981)

The instruments of policy are the vehicle through which policies are actualized. They comprise of the following (Ali-1981):

(a) A legal device which may be called 'legal instruments'. This embodies the policy or parts of it in the form of laws, decrees, regulations, formal agreements and contracts. It stipulates obligations, rights, rewards and punishments connected with its being obeyed.

(b) An organizational structure that is put in charge of implementing the policy.

(c) A set of operational mechanisms which are the levers or actual means through which the organizational structure finally implements the decision on a day-to-day basis and attempts to acquire the desired effects on the variables the policy has set out to influence

Recognising the need for total commitment in this respect, the Islamic Foundation for Science, Technology and Development has recommended the strengthening and establishing of "a high level central authority at the national level, responsible to the chief executive of the state, to formulate, plan, coordinate, and implement a national science and technology policy, including R & D activities, and to ensure that this policy is closely tied to the national plan for socio-economic development" (IFSTAD-1979).

"The formulation of national S & T policy is necessarily a political process, involving the understanding and commitment of the general public; the scientists and technologists; of the users of scientific and technical knowledge; and the support of political leadership" (Kim & Sagasti-1975).

It follows from the above discussion that the basic elements of S & T policy are:

a. a strong political will and a firm commitment of governments to provide adquate financial and administrative support to the creation and use of technology for development.

b. the planning of research, development and engineering activities in terms of national and regional needs and priorities, and their proper evalution and coordination.

c. functional linkage of R & D and educational institutions with production and services sectors, and feedback between producers and users of technology.

d. proper logistic support and improvement in the status and privileges of scientists and technologists, their involvement in the planning process, and a proper understanding between them and the administrators.

Value Assimilation Through Policy

The success of S & T policy can only be judged by the degree to which its practitioners have attained their declared objectives, and not simply by an increase in the number of scientists or laboratories or the gross national product per capita. In the context of our discussion, the goal and the objectives that policy will seek to achieve will be determined by our earlier discussion on the relevance of Islamic values to scientific and technological development. The result should be not only economic growth and scientific and technological progress but also the social propagation of the effects of both to all sectors of the population (Bresani & Sagasti).

The Makkah Declaration

The Makkah Declaration was signed on January 28, 1981 by Heads of States of member countries of the Organization of Islamic Conference at the end of their third summit conference. The following points in the declaration are of interest and relevance to a study of scientific and technological development (OIC-1981).

(a) "Strict adherence to Islam and Islamic principles and values, as a way of life, constitute the highest protection for Muslims against the dangers which confront them".

(b) "Despite all its material and scientific and technological achievements, mankind today suffers from poverty of the spirit, from moral and ethical decay, and societies are marred by inequities, economies are crippled by severe crisis and international political order is in constant danger of destablization".

(c) "Aware of our common interest, we declare our determination to eliminate poverty from which some of our peoples continue to suffer, by consolidating our economic cooperation on the basis of complimentarity and pooling of our resources to achieve coordinated development of our countries. We also declare our resolve, in a spirit of Islamic solidarity, to promote economic development of the countries which are least developed amongst us. We further pronounce our resolve to

rationalize our development policies in order to ensure balanced progress in both the material and spiritual domains''.

Needless to say the Makkah Declaration will not feed a single hungry child or cure one diseased body if it remains just that — a declaration. At the same time, no declaration is a realistic course of actions. On the contrary, it is a statement of the ideals that the signatories profess to pursue. For the purpose of this study we'll assume reasonable correspondence between the professed ideals and the practised reality in the Muslim World in the post-Declaration era.

It follows from this assumption that governments in the Muslim World claim to recognise the following:

(a)   Muslims must live by Islam
(b)   The world suffers from moral decay despite scientific achievements
(c)   Muslims must seek complementary and coordinated development to eliminate poverty.

The Implications

Translated into considerations of scientific and technological development, these ideals dictate a policy that can be unique in more ways than is generally recognized. Some of these are:

(a)   S & T policy must promote the practice of and commitment to Islam as a way of life among Muslims. Those in charge of formulating and implementing the policy must know what is the Islamic way of life and must not continue to pretend that science and technology are value-free secular enterprises. The instruments of policy — the legal devices, organizational structure and operational mechanisms — must all be geared to promote what is ma'roof (permitted) and to prevent what is munkar (prohibited) by Islam. This a radical departure from the S & T policies in the Western World — and their apologetic copies in the Muslim World — which assume as their principal product a growing inventory of gadgets and systems which can be used as much to promote the prohibited deeds as the recommended ones without distinctions.

(b)   S & T policy must direct scientific and technological effort into promoting a moral climate among its practitioners. Morality is a manifestation of man's understanding of his rights and responsibilities toward fellow men and towards the supreme being that he recognizes to be his Creator. In the western world this has been the exclusive domain of the non-scientist, and scientist has at best taken the non chalant attitude that the production of material goods and systems in itself will lead to happiness for mankind. This did not come to pass.

(c)   Since the primary function of S & T policy is the allocation of human and natural resources to the fulfilment of certain perceived needs, this policy in the Muslim World must first define the extent and limits of both the resources and the needs. Since the Makkah Declaration recognises and stresses the unity of the Muslim World, its impact on S & T policy must result—in principle—in an integrated approach to development. In practical terms, the Muslim countries must cooperate in allowing freedom of movement of scientific talent and manpower among all of them. The Muslim world should set up a common economic and trade community to better utilize their own resources among themselves. They should set up institutions to monitor resources, develop strategies and assess needs, and answers to those needs, within the framework of one giant geographical zone from the West of Africa to the East of Asia, cutting across political lines that reduce the effectiveness of the Muslim world's vast natural endownments.

It is too early to assess the actual impact of the Makkah Declaration, beyond the conjectural attempt made above. The Organization of Islamic Conference has established certain organizational entities whose success or failure will determine the nature of this impact. The most relevant of these new entities is the Islamic Foundation for Science, Technology and Development (IFSTAD) based in Jeddah which has recently begun operating.

Policy-making for scientific and technological development is an important undertaking for Muslim countries. It can be accomplished only within the social and moral value-system in which Muslim societies must operate. It must be a coordinated and complimentary effort in the spirit of Muslim unity. The Makkah Declaration recognizes these truths and the decisions contained in the Declaration — if implemented — are expected to have a favourable impact on the evolution of a unified science and technology policy in the Muslim World, leading to scientific and technological development springing from the divinely ordained Islamic values.

Education

On a long-term basis, it is not sufficient to integrate Islamic values in the policy-making process. To be truly installed as the bedrock of all scientific and technological development, Islamic values must find a receptive home in the hearts and minds of the human element that ultimately controls and directs development. In other words, the scientist and engineer must be trained in the best traditions of Islamic education from elementary to the postgraduate level and beyond. A well-rounded and integrated system of education should shape his personality so that Islam becomes his motivating force in life. When a generation of such scientists and engineers takes the helm of affairs at critical levels of the workforce, Islamic values and concerns will

form the natural milieu in which society will operate happily. No transplanting or grafting of Islamic values on a system devoid of them will be necessary.

Recommendations: The Fourth World Conference on Muslim Education dealt with the process of Islamizing education. Among its recommendations, it asked that teachers should be trained in the Islamic perspective on teaching methods so that they can relate scientific facts to the comprehensive plan of Allah in the universe and make students more and more conscious of the role that man should play in natural environment and society according to the Islamic code of life....Nature should be defined as nothing but the creation of Allah, who has laid down laws which Nature cannot but obey. Teachers should make the students conscious of the relationship between Allah, man and nature as they find it explained in the Holy Qur'an and the Sunnah so that the study of natural and applied sciences become integrally related to the essential principles of existence. (WCME-1982)

Earlier, the Second World Conference on Muslim Education has recommended that science and technology curricula should be planned through analysis of an Islamic hierarchy of needs which are, first, the necessities, then, the conveniences and, lastly, after satisfying these needs in an egalitarian system, the refinements. These needs must meet, in a descending order, the interest of the *ummah,* the public interest of the country, the interests of the various sectors of the economy and, lastly, the special interest of individuals. This would avoid misallocation of resources, brain-drain, etc., while contributing to the development of appropriate as well as strategically necessary sciences and technologies.

"Different strategies should be adopted for introducing Islamic ideology, ethics and values in science and technology curricula where optimum conditions are not present."

the workplan; The formulation of an integrated Islamic system of education is one of the greatest challenges facing Muslims today. Vital to this formulation is the Islamization of knowledge, itself. One of the pioneering groups of scholars in this field has presented a systematic workplan which we summarise below: (al-Faruqi-1982)

1. To master the modern disciplines and the Islamic legacy through producing an anthology of works of Muslim scholars of the past and analyzing those works against their historical background in order to understand their crystallization of the Islamic vision.

2. To establish the specific relevance of Islam to each area of modern knowledge, and to survey the major problems of the ummah and of mankind in order to confront them and to contend for their solutions according to Islam.

3. To seek ways for creative synthesis between the legacy and modern knowledge, such that the legacy becomes continuous with modern achievement and begins to expand the frontiers of modern human knowledge.

4. To launch Islamic thought on the trajectory which leads it to fulfilment of the divine patterns of Allah (s.w.t.).

The above-mentioned workplan further assigns the first priority to 'the production of a standard textbook in each discipline which would state definitively the relevance of the Islamic vision to that discipline — and serve as a general guide for further Islamic minds to follow. The university textbook is truly the final end of the long process of Islamization of the disciplines.'

Conclusion

The assimilation of Islamic values in scientific and technological development must proceed through the establishment of proper science and technology policy as well as the reshaping of the educational system. It is imperative, however, that an understanding and appreciation of the relevance of Islamic values to development prevails among those in positions of responsibility. It is also imperative that Islam itself command the loyalty and commitment of the Muslim society. With that commitment, the process of assimilation will yield a well-woven fabric of development. Without it, the result will be a patchwork of discordant elements ready to be torn to pieces by the first serious challenge to its validity.

References

ALI, M.I. Causes of underdevelopment in the LDCs. (Unpublished; presented at a Seminar of Physics Department, King Abdul Aziz University, Jeddah, 1981).

BRESANI, J.B. and F.R. Sagasti. Research conference on the multi-national firm and the nation state, Philadelphia, University of Pennsylvania, 1971.

ECONOMIC Commission for Western Asia. The status of science and technology in the Western Asian region. *Views from the third world,* edited by S. Radharkrishna. Kuala Lumpur: Pergamon, 1980.

al-FARUQI, Ismail R. (International Institute of Islamic Thought). Islamization of knowledge: general principles and workplan. [Unpublished].

ISLAM and the West International. Report of the General Assembly of Islam & the West International. Geneva, 1981.

ISLAMIC Foundation for Science Technology and Development. Proceedings of Conference of Heads of States of member States of OIC, Jan., 1981.

KETTANI, Ali. Lecture at King Abdul Aziz University, Jeddah, 1982. [Unpublished].

KIM, H—K and F.R. Sagasti. Science and technology policies and institutions: discussion report. *Issues of development: towards a new role for science and technology,* edited by M. Goldsmith and A. King. Oxford: Pergamon, 1979. p. 209-211.

KING, A. The dilemma of science policy. *Round Table* no. 247 (July 1972): p. 339-354.

al-KUSAYER, Taufik and Iqbal J. Unus. An Islamic perspective on technology transfer. *Muslim scientist,* vol. 11 no. 2-3 (Jun — Sept. 1982): p. 35.

MAUDOODI, Abu A'la. Toward understanding Islam. Plainfield: Rep. by MSA of the USA & Canada, 1980.

NAQVI, S.J. National planning for science and technology: impact of nationalistic, cultural, and socio-political factors on policy. *Muslim Scientist,* vol. 8 no. 1 (March 1979): p. 25-29.

NAQVI, S.J. & I.J. Unus. A model for science policy-making for Muslim countries. *Muslim Scientist,* vol. 8 no. 1, (March 1979): p. 3-4.

NASR, S.H. Reflections on methodology in the Islamic sciences. *Hamdard Islamicus,* vol. 3, no. 3 (1980).

ORGANIZATION of Islamic Conference. The Makkah Declaration: proceedings of Conference of Heads of States of member states of the OIC, Jan. 1981.

—. Report of the Organization of Islamic Conference to the United Nations Conference on Science & Technology for Development, Vienna, 1979.

QURESHI, A.A. *Journal OF IMA,* vol. 13 (Oct. 1981): p. 135.

SARDAR, Z. Why Islam needs Islamic science. *New scientist,* 1 Apr. 1982: p. 25-28.

UNITED Nations Conference on Science & Technology for Development. Science and technology for development: international conflict & co-operation, compiled by Pamela M.D. Onafrio. Sweden, 1979.

UNUS, I.J. Matters of policy. *Muslim scientist,* vol. 9 no. 3 & 4 (Sept. — Dec. 1980): p.l.

—. Working paper on a proposed study of science & technology policy-making in Muslim countries. 1981. [Unpublished].

WORLD Conference on Muslim Education (2nd: Islamabad: 1980). Report.

WORLD Conference on Muslim Education (4th: Jakarta: 1982). Recommendations.