The Roadmap of Achieving Excellence in Agriculture Higher Education

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Executive summary

The economies of most of member countries of Islamic development bank (IDB) are based on agriculture, oil and gas. However agriculture is the main source of economy of the whole Muslim World and most of the work force earns living from it. Despite that, the agricultural productivity of Muslim majority agricultural economies lags far behind, when compared to the global leaders in agricultural exports.

To face low agricultural productivity, the Muslim world is taking some actions to promote agricultural development and increase food production such as US $ 1.5 billion approved by IDB for addressing the food crisis in its poorest member countries. The package, known as the Jeddah Declaration, will be disbursed over a 5-year period and will include short, medium, and long-term programs to deal with the crisis.

There are many reasons of this poor agricultural productivity in IDB member countries, among which are lack of adequate number of qualified and trained scientific manpower and lack of technological development in agriculture. In addition, agricultural education and training have been isolated from the market place and from the rest of the education system. This isolation has been leading to curricula irrelevance, falling teaching and learning standards, unemployment of graduates and, thus, decreasing investment support. Responses to such crisis were mostly fragmented and inward looking, lacking a vision and a systemic approach. Operating in a sort of "ghetto", or an "Ivory tower".

To this end, it is the aim of the higher agricultural education roadmap to reform IDB member countries-based agriculture learning institutes to become "functional developmental institutes" providing valuable resource for business, industry and society and upgrading them to become world-class institutions of higher learning through balancing international academic standards with national needs and local identity and culture.

To achieve that, the roadmap will focus on reforming agriculture learning institutes to serve agri-business and industry community, farmers community, agriculture policy makers, public community, research and development community and agriculture education community through promoting agriculture research and development as well as improving agricultural education quality by curriculum reform and modifying teaching methods and technology.

In abid to implement the roadmap and transform agriculture learning institute into center of excellence, an action plan is proposed which includes the development of locally relevant and multidisciplinary curricula, the development of online directory for agriculture science education resources, the development of independent and locally-driven R&D agenda, setting up intelligence system for promoting agriculture investment, establishing of agro-industry business incubator, setting up "Initiative for strengthening capacities in agriculture policy-making." and setting up Islamic Agropedia which is an online repository of agricultural education for all.

1. Introduction

Agriculture is considered a strategic priority for countries, balancing export deficits and providing food security which is undoubtedly an issue of prime importance that developing countries are facing today, as it penetrates to the heart of the concept of human survival.

According to the World Food Summit 1996, food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle.

As 75% of the poor live in rural areas, agriculture represents the backbone of rural economic activity. Agriculture extends beyond the need to develop food production as investment in a range of other activities is also needed such as off-farm enterprises.

Directing resources to agriculture helps increase productivity, employment and access to food. Investing in rural infrastructure, agricultural research, education and developing credit markets as well as providing safety nets are essential for supporting agricultural growth.

To meet the challenges of agricultural production and food security today and in the 21st century, countries must be willing to invest in their human capital for development. Improving human capital in agriculture is especially important in the low-income, food-deficit countries where the shortage of trained human resources is a major limiting factor to development.

No country has become developed without well-educated people and a strong agricultural base that provides food security. Good educational systems will not solve all of the problems, but they are a prerequisite for sustained agricultural production and economic development.

The mission of agricultural education in the 21st century is to work toward improved, relevant, and effective teaching, research, and extension. To contribute food security for all, education in agriculture must prepare a critical mass of dedicated, well-trained men and women who are committed to achieving socio-economic development.

To persistently promote agriculture development through science and education, the awareness of innovation much be enhanced through the use of new ideas and methods, and work out crucial measures to bring about major breakthroughs in agricultural science and technology, so as to boost development through innovation.

Agricultural education should consolidate the present strengths and educational planners need to transform the system by planned initiatives for appropriate human resource development in right perspective including improving quality of post graduate education and doctoral research, faculty competence, student

evaluation for competence and performance, distance education, vocationalisation as well as promoting investments in agriculture.

Agricultural education must focus on the use of frontier science including biotechnology, information and communication technologies as well as nanotechnology for agricultural development. It must also focus on developing new and more competitive crop products and new uses for diverse crops; developing new products and new uses for animals; reducing the risks of local and global climatic change on food, fiber and fuel production; providing the information and knowledge needed to further improve environmental stewardship; improving economic returns to the producer; strengthening families and communities; and ensuring food safety and health throughout the food production chain.

It is imperative to reform the current agricultural science and technology system, gradually establish a globally advanced agricultural science and technology innovative system, an agricultural technology popularization system that can efficiently convert research results into productivity and an agricultural education and training system that can constantly improve farmers' scientific and cultural qualities.

The 2004 report of InterAcademy Council is amongst many that have highlighted the importance of universities in developing countries being vibrant centres of excellence capable of propelling their nations into the knowledge economy. All the studies agree that without sufficient skilled scientists, entrepreneurs, managers and technicians even the best development plans and projects will fail.

To this end, it is the aim of the higher agricultural education roadmap to strengthen the capacity of universities and colleges to build the required human capacity through defining needs and setting priorities for agricultural institutions aspiring to evolve world-class institutions of higher learning through balancing international academic standards with national needs and local identity and culture.

II. Agriculture development in the Muslim World…present development and future prospects

The economies of Muslim majority countries are based on agriculture, oil and gas. However agriculture is main source of economy of the whole Muslim World and most of the work force earns living from it.

Of the 57 Muslim countries located in five geographic regions including the Middle East and North Africa (MENA), Europe and Eurasia, South Asia, East Asia and the Pacific as well as Sub-Saharan Africa, 24 are agrarian (at least 50 percent of the labor force employed in agriculture), 22 oil producers, many located in the MENA region, and nine countries re neither agrarian nor oil producing. Only Turkey and Malaysia can properly be described as industrial

From Egypt, Indonesia, Bangladesh, and Sudan, to Pakistan--many Muslim majority countries are facing some of the worst pains of the current global food crisis. For example, Oxfam's recent report, "Food Crisis in Pakistan: Real or Artificial", says the number of poor in the country has risen from 60 to 77 million since 2007 because of food inflation. In fact food related riots have been seen in many of these countries. Ironically, it's these same economies which are some of the most agriculturally endowed in the world.

According to the UN's Food & Agricultural Organization, Pakistan is the world's top producer of buffalo/goat milk, buffalo/ goat meat, chick-peas, and sugar cane; Bangladesh is a leading producer of rice, jute , goat milk/meat ; and Indonesia is a leading producer of coconuts, green beans, tropical fruits, eggs , and rice in addition to many other agricultural products.

Many of the 57 IDB (Islamic development bank) member countries are agriculture centered economies producing a major portion of the world's food commodities. As shown in the table below--Indonesia, Pakistan, Turkey, Iran, and Egypt have the biggest agriculture outputs within the Muslim world (by GDP - PPP contribution.)

Country	2007 Agricultural Output Value ($ Mill - PPP)
Indonesia	$ 116,431
Pakistan	$ 84,851
Turkey	$ 75,997
Iran, Islamic Rep.	$ 68,661
Egypt, Arab Rep.	$ 55,945
Nigeria	$ 52,410
Bangladesh	$ 39,369
Malaysia	$ 30,702
Sudan	$ 25,509
Syrian Arab Republic	$ 21,689

Data Source: World Bank - World Development Indicator 2007

Most of these top agricultural based economies are also some of the poorest and hardest hit by the global food crisis. Within the ten major agricultural Muslim world economies, Bangladesh, Sudan, Nigeria, Pakistan and Indonesia have the lowest GDP Per capita (PPP.)

Country	Agricultural Output Value ($ Mill)	Agriculture, value added (% of GDP)	GDP - per capita (PPP)
Bangladesh	$ 39,369	19%	$1,400
Sudan	$ 25,509	32%	$1,900
Nigeria	$ 52,410	18%	$2,100
Pakistan	$ 84,851	21%	$2,400
Indonesia	$ 116,431	14%	$3,600
Syrian Arab Republic	$ 21,689	24%	$4,700
Egypt, Arab Rep.	$ 55,945	14%	$5,000
Iran, Islamic Rep.	$ 68,661	9%	$11,700
Turkey	$ 75,997	9%	$12,000
Malaysia	$ 30,702	9%	$14,500

Data Source: World Bank - World Development Indicator

Many Muslim countries after gaining national independence became dependent on agriculture and food production. They became the producers and suppliers to the world food market, particularly in terms of primary agriculture and food products. However, the value added of these agriculture and food raw materials was very small and almost negligible; that is when they bought back processed food products for domestic consumption to feed their population, they had to pay much more.

In addition to that, many Muslim countries face problems of inadequate food production due to insufficient food supplies and inefficient food distribution system. In this context, this has led to dependency on massive import from other countries to meet their basic requirements. Overdependence on food imports threw some of the poor countries including those of Muslim countries into a vicious debt cycle.

When compared to the global leaders in agricultural exports, the agricultural productivity of Muslim majority agricultural economies lags far behind. Amongst the largest 10 agricultural economies Egypt, Bangladesh and Pakistan are the most productive when measured by the $ Agricultural output/ square km, whereas Sudan, Nigeria, Algeria and Turkey are the least productive.

Country	Agri Productivity ($ mill Output/ Sq. km)
Egypt, Arab Rep.	1.64
Bangladesh	0.47
Pakistan	0.42
Malaysia	0.4
Syrian Arab Republic	0.4
Iran, Islamic Rep.	0.36
Indonesia	0.34
Turkey	0.29
Algeria	0.22
Nigeria	0.16
Sudan	0.15

DinarStandard.com Analysis based on World Bank - World Development Indicator 2007, CIA World Fact Book data

In many Islamic countries, rising industrialization and urbanization have overshadowed agriculture and pushed it to the sidelines. But recently, leaders of these nations have realized the significance of agribusiness and have begun to focus on and facilitate massive schemes and projects to boost agricultural output.

There are certainly indications that the Muslim world is taking some actions to promote agricultural development. At the Government level, recently, the 57 nations of the Organization of the Islamic Conference (OIC) have come together to cooperate on increasing food production. For example, the Kuwait Government launched "decent living" fund. The Amir of Kuwait has donated $ US 100 million to establish the fund for "decent living" in Muslim countries, and another $ 300 million to the Islamic Development Bank's (IDB) Poverty Fund.

Meanwhile, the Islamic Development Bank (IDB) has also pledged US $ 1.5 billion toward addressing the food crisis in its poorest member countries. The package, known as the Jeddah Declaration, will be disbursed over a 5-year period and will include short, medium, and long-term programs to deal with the crisis.

Faced with a scarcity of fertile land and water shortages, the six members of the Gulf Cooperation Council (GCC) - Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE - are seeking to secure their food supplies by investing in agriculture abroad. Saudi Arabia and the United Arab Emirates, the top food importers among GCC countries, are now looking to Asia and Africa as opportunities for agricultural investments. This could contribute and benefit greatly by investing in the great agricultural sector potential of the Muslim world economies which makes human resource development in OIC African, Arab or Asian countries is of great interest to all OIC member countries.

III. Higher Agriculture education in IDB member countries

The Organization of the Islamic Conference (OIC) is a group of 57 geographically-scattered countries with predominantly Muslim populations of 1.4 billion people (22% of the world's population) spread on 30.4 million square kilometers (20.6% of the world's land area) from Indonesia to Morocco and from Uganda to Kazakhstan. 69% of Muslim population lives in Asia while 27% Africa only about 3% in Europe and rest in the whole world.

Despite being 22 per cent of the world population and having 70 per cent of energy resources, and 40 per cent natural resources, the contribution of OIC countries towards world income is only 8 per cent. Even the trade within the Muslim world is less than 13 per cent. 39 per cent of population lives below the poverty level as 22 of the 50 least developed countries in the world are OIC Member States.

The Gross Domestic Product (GDP) of Islamic countries is US$ 4.3 trillion a purchasing power parity basis (8.7% of the world's GDP). Total world trade with these nations adds to over US$ 800 billion. The major concern is that how to

improve the GDP from 8.7% of the world's GDP to 20% according to the volume of Muslim world.

There are many reasons of this poor GDP, among which are lack of trained manpower, inadequate institutional and legal frameworks for integrating environment and development-related issues, highly centralized decision making, absence of political will to change the status quo, lack of adequate number of qualified and trained personnel, non-availability of financial resources on a timely basis and above all poor management.

A. Science, technology and innovation….present status

United Nation Development Programme (UNDP) has grouped countries of the world in terms of technology into leaders, potential leaders, dynamic adopters and marginalized countries. Only Malaysia and Turkey are classified among potential leaders while the rest of the OIC countries fall under the category of marginalized countries.

A similar grouping by Rand Corporation has classified countries into scientifically advanced, scientifically proficient, scientifically developing and scientifically lagging countries. Only 8 OIC countries namely, Turkey, Uzbekistan, Pakistan, Iran, Kuwait, Egypt, Turkmenistan and Indonesia, were classified as scientifically developing countries while the remaining 49 OIC countries were classified as scientifically lagging countries.

In terms of research productivity, impact and excellence, no single university from the Islamic world was mentioned in list of the top 500 universities of 2007, while many other developing countries such as Mexico, Brazil, India, South Africa and Argentina were included in that ranking.

B. Higher education in agriculture

Studies indicated that developing countries including IDB member countries showed similar enrolment pattern by area of study to the developed ones, although some countries clearly emphasize science and agriculture more than the others. Similarly, the pattern for awarded degrees showed that developing countries produced equal or higher percentages of science and agriculture degrees relative to total degrees when compared with developed countries. Nevertheless, when evaluating science and agriculture study on a per capita basis, developing countries produce far fewer graduates than developed countries due to the relatively restricted access to university study found in under-developed nations.

In case of IDB member countries, after independence, universities dramatically increased undergraduate numbers. But under funding, lack of career prospects and professional isolation has lowered morale and caused many staff to leave. This has brought about an urgent need to build up the human capacity that Islamic countries needs for sustained endogenously driven innovation, especially in its most critical industry – agriculture.

Thus, the improvement of a country's human resource capacity for productivity is a pre-requisite for social and economic development.

University education in agriculture in IDB member countries is at a crossroads. Financial constraints are severe and the demand for higher quality education has never been greater. There is a need for greater educational relevance and higher quality graduates. There is an obligation to enroll more women and to produce students who are prepared to go on to positions of leadership.

In the agricultural sector, both formal and non-formal education are essential for improving food security and rural employment and reducing poverty. Formal agricultural education is needed for the production of skilled manpower to serve the agricultural sector through extension, research, entrepreneurship and commerce. Non-formal agricultural education, often provided by both public and private extension services, is needed for training of farmers, farm families and workers and for capacity-building in a wide range of rural organizations and groups.

As teaching methods and curricula are not being adjusted to the new requirements and demands for trained manpower in agriculture, especially in the private sector, the university graduates are no longer automatically being hired by governments and employers in the private sector are demanding graduates with different and higher level, skills and knowledge. Education abroad, which has been seen as a way to fill the manpower gap, has often proved to be inappropriate to the unique development needs of IDB member countries .

Agricultural education and training have been isolated from the market place and from the rest of the education system. This isolation has been leading to curricula irrelevance, falling teaching and learning standards, unemployment of graduates and, thus, decreasing investment support. Responses to such crisis were mostly fragmented and inward looking, lacking a vision and a systemic approach. Operating in a sort of "ghetto", or an "Ivory tower".

Education and training needs to address rural development, sustainable natural resources management and poverty reduction, with a broad, holistic focus by redefining its strategies and responsibilities and expanding its target .

The basic point is that the lack of technological development in agriculture in IDB member countries is not something reducible to simple solutions such as lack of finance. Nor is it due solely to lack of research skills since much more could be made of existing capacities. The real need is for agricultural roadmap that permits the involvement of all actors in the value chains and the symbiosis of knowledge search with knowledge use as well as providing adequate investment in human capital development and providing a sound education and training system to build a talented, skilled and world-class workforce capable of taking on challenging tasks. Only when that is successfully achieved will the problems begin to reduce.

IV. Higher agriculture education roadmap

Given that the majority of poor people live in rural areas or rely on agriculture , and that agriculture paves the way for economic growth in the poor IDB member countries , agricultural and rural development will underlie progress on the broad array of economic and social indication stressed by the Millennium Development Goals which its first goal is the one that clearly involves the agricultural sector: The poor around the global are disproportionately farmers, and perversely, the hungry also most commonly find their livelihood through agriculture. By increasing food availability and incomes and contributing to economic growth, higher agricultural productivity and supportive pro-poor policies allow people to break out of the poverty-hunger-malnutrition trap.

The vital contribution that higher education must continue to make to the development process is increasingly recognized, especially given the growing awareness and acceptance of the role of science, technology, and innovation in economic renewal. The emerging trends suggest urgency in rethinking and reshaping the way higher agricultural education is delivered within the IDB regions including African, Arab and Asian countries.

Agriculture learning institutes must be a valuable resource for business, industry and society and must be integrated into the production sector and society in many ways. They must become "developmental institutes" working directly within the community in which they are located through functioning effectively as engines of development by adapting and changing, forging closer links with the private sector, training graduates for professional careers, and diffusing knowledge into the economy.

1. Aims and objectives

Higher agricultural institutions should manage their separate and collaborative programmes and resources in a coordinated manner to achieve common objectives including the following:

(A) Developing Agriculture workforce

Greater commercialization of agricultural systems and increasing trade liberalization dictate the need for better capacity on the part of the agriculture workforce in the 21st century. Global changes in the roles of the public and private sectors and the dramatic advancements in technology have also strongly affected agricultural workforce development needs. These evolving changes have important policy, institutional and programmatic implications. Agriculture human resource development must be placed in the context of current concerns for the development of national knowledge economies and "higher agriculture education for the knowledge economy."

Agriculture innovation must be accompanied by institutional change so that the context is right for innovation. All stakeholders, who include farmers, extension workers, in-put suppliers, trader, processors and policy makers, etc., must be

involved in conceiving, developing and validating innovations. That will require human capacity in all subjects at all levels.

Thus, programmes, structures and teaching methods must be oriented towards local problems and the needs of small and medium-size farm families, and which work in close collaboration with rural communities, development structures and service agencies or firms.

(B) Setting up agricultural science and technology innovative system

In abid to develop agriculture through science and education, it is first necessary to enhance the awareness of innovation. For example, China has currently established a relatively comprehensive agricultural science and technology system but the overall level of agricultural science and technology, particularly innovative abilities, still lags behind the advanced world level. Thus, to bridge this gap in IDB member countries, new ideas and methods, and work out crucial measures to bring about major breakthroughs in agricultural science and technology, so as to boost development through innovation, must be established.

IDB member countries must take advantage of knowledge and technologies developed out of Islamic world, but there are problems and opportunities that will only be addressed if IDB member countries have their own capacity to acquire knowledge and make new discoveries that will fuel endogenous innovation.

Economic creativity is driven by the quality of 'technology linkages' and 'knowledge flows' amongst and between economic agents. Thus effective agricultural innovation requires a network of inter-institutional linkages involving actors across the whole value chain from concept to adoption.

Agricultural science and technology innovative system can efficiently convert research results into productivity.

Also, technology innovation strategy in the agriculture sector requires to have an integrated, systemic and participative approach in the management of Agriculture among all the stakeholders, such as:

- **Government, to establish and implement a National (also regional) policy/strategy conducive to an "enabling environment" for all stakeholders to adequately play their role. As examples: funding of agricultural R& D programmes, providing incentives to private sector utilising local Research results, promoting awareness of people to acquire scientific culture, etc… ;**

- **Scientific/Technical/Higher Education Communities, to generate "Agricultural Technology packages," diffuse and share relevant knowledge among students and practitioners, as well as to sensitize societies, and other stakeholders on**

innovations and new research achievements in agriculture and related branches;

- **Economic Enterprises, both private and public, to transform "Agricultural –Technological -packages" into goods and services to be absorbed by local, regional or international markets;**

- **Funding Agencies, such as agricultural banks, to assist in investments in programmes for agricultural primary production as well as for processing and adding value to agricultural crops and products;**

- **Civil societies, such as Consumers or Ecologists associations, to watch and alert on peoples rights and interests protection**

For all these stakeholders, a permanent flow of information, interaction and partnership should be entertained among them, as illustrated in figure I.

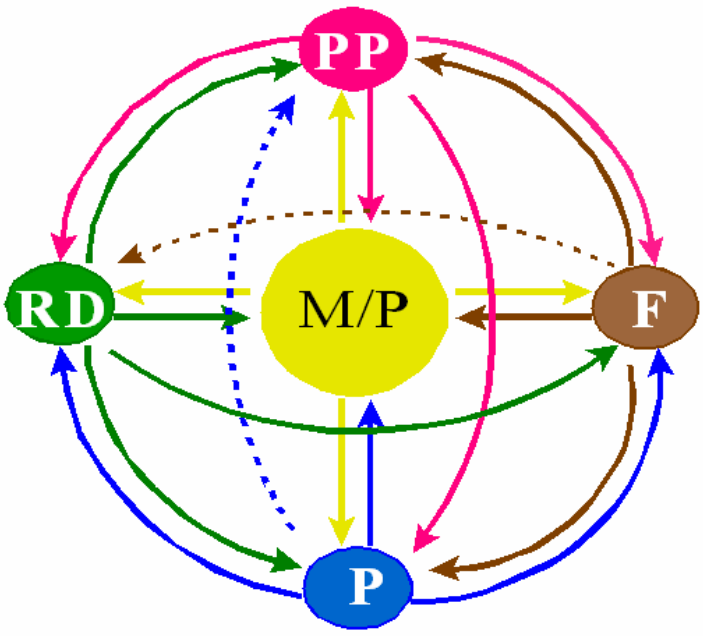

Figure 1: STAKEHOLDERS OF TECHNOLOGY INNOVATION STRATEGY AND THEIR INTERACTIONS (KANE, 1996)

PP : public power
R-D : research and development institutions
P : Production Enterprises
F : Funding Agencies
M/P : Market/Population (Civil Society)

2. Targets groups

No country in the world has achieved economic growth without developing the science and technology capacity and agricultural research and training is no exception. This requires a vibrant, dynamic, well-networked agricultural higher education system that is linked with the farming community, private sector, national agricultural research organizations, international agricultural research centres, NGOs and higher education institutions in other countries. By improving such linkages, faculty and staff are better able to identify science and technology needs that are relevant to their own country's context. These linkages must extend even beyond the scientific-institutional stage, and should include linking ministries of education with ministries of agriculture, finance, health and international agencies.

Thus, institutions of higher agriculture education should focus on the targets groups indicated below:

(A) Agri-business and industry community

Institutions of higher agriculture education should focus on addressing industry workforce needs ranging from attracting and preparing young people for agricultural careers; and providing in-service training for agricultural workers in the industry as well as establishing linkages with relevant private and public agricultural agencies. It should also address local needs and adapt curricula to employment needs; integrate or closely collaborate with research and extension; to be open to the professional environment and make use of resources from the private sector.

(B) Farmers community

Institutions of higher agriculture education must play a developmental role by establishing links with farming communities with the aim to develop an agricultural education and training system that can constantly improve farmers' scientific and cultural qualities. Research and dissemination of best practices and case studies which illustrate the contribution of education to sustainable agriculture and rural development and food security .

(C) Agriculture policy makers

Agriculture learning institutes must contribute to community development by improving its service to policy makers and contribute in placing agriculture education at the core of regional and national development agenda. Training of policy makers and managers on education for rural development, food security and sustainable agriculture

(D) Public community

Agriculture learning institutes must encourage the growth of outreach programmes and greater institutional involvement in rural development in the surrounding communities as well as setting public awareness programnmes about sustainable agriculture

(E) Research and development community

Agriculture learning institutes must conduct research and development (R&D) for industry, create their own spin-off firms and involve in the capital formation projects such as technology parks and agribusiness incubator facilities, introduce entrepreneurial training, and encourage students to transform research into enterprises.

Agriculture learning institutes should be gradually transformed into technology development organizations of science-type enterprises or enterprise groups as well as agricultural science and technology and information intermediary consultant organizations.

(F) Agriculture education community

Agriculture learning institutes promote agricultural education programmes which are job-oriented and meet the actual needs of the communities, the regions and the countries. It should also promote agricultural education systems which include youth education, adult training and continuing education in a co-ordinated way to make the best use of facilities, equipment and staff.

(3) Elements of agriculture roadmap

In abid to achieve its objectives and service its target groups, the roadmap will include the following elements:

(A) Improving agricultural education quality

a- Curriculum reform

Curriculum reform is needed to create an adaptive generation of professionals. Agricultural universities and colleges must critically review of subject-matter content and a judicious re-planning of courses to fit employment opportunities and to address the problems and issues of sustainable agricultural production and rural development .

Curricula should include important topics that are generally missing such as the role of women in agricultural development, farming systems management, agri-business and marketing, environmental protection, population issues, agricultural applications of frontier science such as biotechnology, information technology and nanotechnology, agricultural and related policies, technologies, management institutions, agricultural business and market, agricultural and

natural resources sustainability and environment, and agriculture and poverty alleviation linkages.

All countries are undergoing market transformation, and the transition is taking place very rapidly at the levels of retail, processing, food service and wholesale. Efforts to enhance and strengthen the presence of IDB member countries in non-traditional and high value food markets can be pursued through investments in productivity and innovation. Tertiary institutions in agriculture will be required to train individuals who understand the market dynamics; trends, drivers and shocks and respond to them through training and advocacy.

There is an increasing pressure for university graduates to be 'work ready', and to have work experience at graduation. Consequently, changes in the application of knowledge include enhancing the link between knowledge and wealth creation, as companies recognise that marketable knowledge is the ultimate organizational capability, and they appreciate the growing influence of information technology on productivity enhancement through knowledge acquisition and management, independent of physical location (Johnston, 1998). With so much agricultural information being readily accessible, especially in electronic form, tertiary agricultural education institutions must equip their students with the expertise to locate, retrieve, decode and appraise the information and apply the knowledge. In the information age, graduates must have research skills which enable them to become familiar with new and emerging fields and respond to changes in the underlying base of knowledge within their specific discipline.

Future training and education in agriculture at the tertiary level has to be accessible, of good quality, relevant, and cost-effective. To achieve this, students and professors would have to work more closely with farmers, other agro-entrepreneurs and policymakers on problems impacting on agriculture and the rural landscape. Faculties will have to be re-tooled, curricula revisited so that students can benefit from the quality environment and receive the education and skills training that are urgently needed.

Curricular revision should include basic foundation courses to be taken by all students, leaving the final portion of the educational cycle for specialized training of subject-matter specialists, research scientists, and those who wish to pursue academic careers.

Agricultural education systems, including extension, formal education, in-service training, and mass media/distance education programs must be examined for their importance and their need to network to prepare the agricultural workforce to meet new challenges.

The development and application of effective agricultural training programmes, methods and resources will require revision of current curricula to address gaps and to make them relevant to development and the needs of future employers. In addition to reinforcing traditional scientific disciplines, Agriculture learning institutes must deliver education and training that goes across disciplinary

boundaries and interacts with other disciplines and development issues which is required for success in modern innovation systems approaches.

Curriculum revision and improved practical skills of graduates must be lead by private and public partnerships with the aim to produce students who can find jobs because they are well-trained and want to work in agriculture.

Fundamentals on the formulation of an integrated Agricultural Policy, within the Ummah, based on STI applications and where Agriculture Higher Education constitutes an important element.

Since performant agriculture should focus both on pre-and-and-post-harvest systems and consider the utilization of best cost benefit technologies, the curricula should include elements on "Technology application". For example, in the Food chain, to increase productivity, yield and quality of crops, with the use of relevant irrigation, Agronomic treatments and harvesting systems, but also to preserve and valorise primary production, through efficient handling, storage, processing and packaging technologies, as illustrated on figures 2 and 3, respectively;

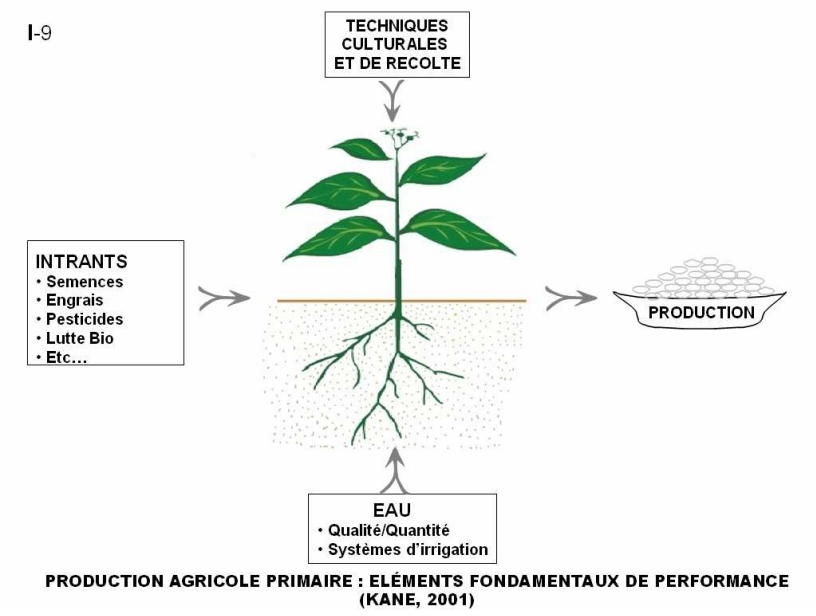

Figure 2: PRIMARY AGRICULTURAL PRODUCTION: FUNDAMENTAL PERFORMANCE ELEMENTS (KANE, 2001)

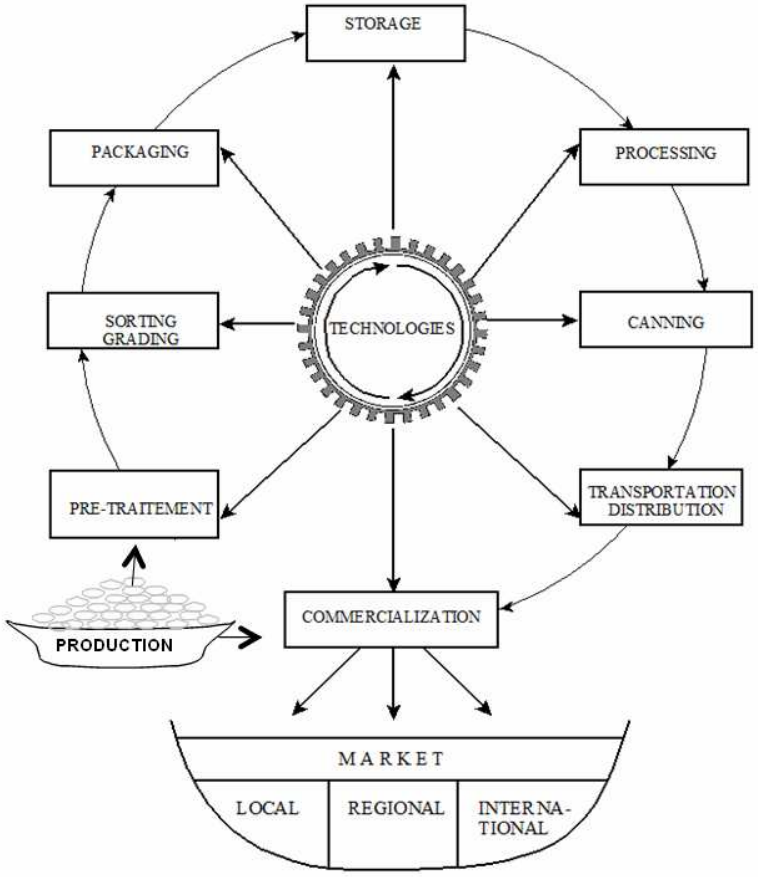

Figure 3: UNIT OPERATIONS CYCLE OF AGRO-FOOD CHAIN (KANE, 1999)

b. Teaching methods and technology

Higher education is beginning to play an increasingly important role in the process of globalization, which promotes information technology development and diffusion of innovation and the ability of economics to benefit from rapid shift in production goods ,services and ideas. This is more true for Agricultural education which has encouraging internationalization project on the back drop of value addition, export potential and emerging high-tech production systems without loosing sight of the local knowledge needs and infrastructure

In Agriculture education sector, the complexities of and interactions between local, regional and global forces have created unending demand for agricultural knowledge, skill and attitude in rural youth. Seeking education farmers and farm women adopting new knowledge, extension worker disseminating it and agricultural scientist generating and developing agricultural knowledge and technology .

With ever increasing demand for higher education in agriculture and allied subjects in IDB member countries, the conventional agriculture colleges and other schools were left with inadequate resources for meeting the demand especially with the explosion of population, information and technology. Thus, teaching methods must be adjusted to the new requirements and demands for trained manpower in agriculture, especially in the private sector .

To this end, the Distance Education System could be ideal tool to deal with challenges facing higher agricultural education including accessibility, quality and cost with the aim to create effective human capital, which is capable of increasing profitability in agriculture enterprise and that it should be able to create social capital, thereby repaying the social costs adequately.

Distance Education System will cope up with the needs of on job people or of unable to get enrolled in conventional system of education .It may be also deal with unsuitability of conventional learning schedules in agriculture.

(B) Promoting Agriculture research and development

Agricultural research is currently not delivering the type of knowledge needed by end-users especially farmers in rural communities, generally because *traditional and indigenous knowledge* have not been taken on board. New systems of knowledge creation and diffusion that take into consideration the needs and experiences of the client are required and tertiary agricultural institutions must be at the forefront of the change process with more focus on a regionally-focused, demand-driven approaches.

Increased trade liberalization results in increased competition, and to be competitive in the world market, countries must invest in research and development that can lead to increased productivity through technological advancements. Advances in *biotechnology, information and communication technologies and nanotechnology* are prominent among current and future technological options for improving agricultural productivity although ethical issues on biotechnology and nanotechnology continue to be debated. Tertiary institutions need to speed up the pace at which they embrace these developments and respond by ensuring that centres of excellence are quickly identified and collaborations established with advanced centres in the north and south to provide leadership in their communities and countries.

The expanding role of biosciences in development illustrates the need to build scientific and technical competencies in areas such as functional genomics and bioinformatics to help close the enormous disparities with regard to scientific knowledge, skills and technologies that currently divide IDB member countries from the rest of the world. This will be accomplished by improving the institutional frameworks in which the scientific investigations are undertaken as well as building the required human scientific capacity. Among the improved competencies required is greater capacity for managing intellectual property.

4. Action plan for transforming agriculture learning institute into center of excellence

(A) Development of locally relevant and multidisciplinary curricula

This curriculum will produce graduates that are appropriately trained for local employment, and not for US or European market. Thus curriculum must focus on the following agricultural scientific fields:

- **Agro-biotechnology**
- **Agro-nanotechnology**
- **Agro-information and communication technologies**
- **Agro-space technology**

Although many developing countries are still not major players in space technology, there is a growing recognition that it can be of practical value — in predicting natural disasters or monitoring crops for example.

Also, the following agricultural topics must be included in the curriculum:

- **Deforestation**

Deforestation — for arable land, pasture, urban use or logging — has led to the loss of about half of all tropical forests, affecting biodiversity, water and nutrient cycling, climate change and sources of income.

- **Desert science**

Two billion people live in drylands, where extraordinary biodiversity exists next to grinding poverty. Modern farming and climate change suggest that the future of drylands may be less stable than in the past.

- **Earth science**

Earth science can help inform and design strategies to cope with natural disasters or climate change. The use of system models also help explain the Earth's past and possible future behaviour.

- **Sustainable farming practices**

Sustainable farming practices, such as zero tillage or integrated pest control, can reduce the need for agricultural inputs like chemicals or water, improve carbon sequestration and help prevent land degradation.

- **Fisheries**

Fisheries and fish trade can provide developing countries with a much-needed source of income and help improve food security but good management is essential to ensure a sustainable future and prevent over-fishing.

- **Sustainable forestry management**

Sustainable forestry management can help developing countries achieve economic growth while protecting natural resources and wildlife habitats. Forestry projects can also help offset carbon dioxide emissions.

- **Livestock**

About 600 million of the rural poor in developing countries rely on livestock for their livelihoods — making issues about animal food and health, farming efficiency and market access vital to reducing poverty.

- **Agricultural water management**

Halving the proportion of people without access to safe drinking water by 2015 is a UN Millennium Development Goal. But equally important are issues of agricultural water management and multilateral water treaties as 66 percent of water is consumed in agricultural irrigation, reaching 90 percent in arid regions, while 34 percent of water is earmarked for household and industrial usage.

- **Agricultural impact of climate changes and adaptation**

Islamic states are the first to seriously suffer from problems related to climate change as 31 countries out of 57 IDB member countries are among the 100 countries most vulnerable to climate change.

Climate change is the greatest challenge facing the world today. Long-term development planning must now include measures to deal with it. Combating the threats of human-induced global warming requires more than reducing greenhouse gas emissions. Equally important are adaptation changes that reduce society's vulnerability to climate change. Also, mitigation and preparedness are vital to reduce the damage and cost of natural disasters like floods, earthquakes and landslides in the developing world — where economic losses in the 1990s exceeded US$600 billion

- **Biofuels "bio-energy or green energy "**

Concerns over climate change have focused attention on the possibility of replacing fossil fuels with biofuels. Across the globe, researchers are testing potential raw materials such as soya and palm oil.

Better access to sustainable energy services is necessary for economic growth and to develop businesses and income-generating activities. Currently, 1.6 billion people do not have access to electricity, and 2.4 billion people rely on traditional biomass – wood, agricultural residues and dung – for cooking and heating.

Thus, energy is central to sustainable development and poverty alleviation efforts as it effects social, economic, and environmental development including access to water, transport, agricultural productivity and food security , health, and education which are some of the strategic priority areas of the 1440 vision of the Islamic Development Bank (IDB).

- **Agriculture and poverty alleviation**

Agriculture is a key component of any poverty eradication and sustainable development and is critical to the achievement of the Millennium Development Goals.

Given that all 57 IDB Member States are categorized as developing countries, poverty alleviation in the Muslim World is both evident and compelling. While the IDB member countries account for 21 % of the global population in 2005,

they make up only 6% of global G.D.P. Of the 50 Least Developed Countries in the world today, where the majority of the populace live in extreme poverty, 22 are IDB Member States.

- **Agriculture indigenous knowledge**

It must combine indigenous knowledge about plants -such as the production of medical compounds derived from plants that have traditionally been used by indigenous peoples to alleviate the effects of HIV/AIDS and malaria - with the development of the local population, curricular planning and the University's areas of research.

- **Agro-industry and business**

This will deal with Agriculture and Natural Resources/Agriculture Production, agro-processing, and agro-business.

In abid to promote cooperation, the IDB member countries must also establish Agricultural Education and Training Portal as a public resource that provides free access to up-to-date information on agricultural education and training for agriculture learning institutes located in IDB member countries with the aim to inform development work in the sector. The portal should track student enrolment, faculty, courses, graduate output and sector trends at universities and technical training colleges awarding degrees, diplomas and certificates in agriculture and related disciplines in the region.

Note:

For each of disciplinary Curricula, a close cooperation should be established with already existing specialised Institutions. For example, for Agro-space Technology, the CRASTE (African Regional Centre for Space Science and Technology) located in Rabat, Morocco could be involved

(B) Development of online directory for agriculture science education resources for IDB member countries.

The online repository aims mainly to provide teachers and scholars from IDB member countries who don't have access to relevant and updated agriculture scientific information with the necessary tools and means to present science to their students in an effective fashion.

This project could cooperate with other similar initiatives such as the "science supercourse project" of Bibliotheca Alexandrina in Egypt that was launched in January 2009. It is an attempt to improve access to science education in developing countries by targeting a total of 100,000 Golden PowerPoint lectures from scientists worldwide within a year and one million in three years.

Jordan and Pakistan in cooperation with United States have also launched a two-year initiative called Blended Learning Open Source Science or mathematics studies (BLOSSOMS) to produce low-tech videos for classroom use in abid to motivate developing countries students to pursue careers in science, mathematics or engineering.

BLOSSOMS aims to develop a large, free, searchable and world-class repository of science and mathematics interactive video modules with voice-over translation covering English, Arabic, and Urdu for local use by high school students. It will be created by gifted volunteer teachers from around the world, seeded initially by faculty members of US-Based Massachusetts Institute of Technology (MIT) and partnering educators in Pakistan and Jordan, namely, Jordan University, the Jordan University of Science and Technology and the Jordan Educational Initiative -- who will help run the BLOSSOMS programme.

In addition, the Mainstreaming Environment and Sustainability in African Universities (MESA) — which comprises more than 77 universities and sub-regional networks — has developed over 65 university courses that facilitate practical approaches to applying environmental knowledge in fostering sustainable development. For example, the African Network of Agriculture and Forestry Education is working with agricultural universities to develop learning materials based on indigenous and local agricultural knowledge. Such schemes will eliminate 'ivory tower' universities which are detached from the environmental realities in their locality

(C) Development of independent and locally-driven R&D agenda for tackling the major agricultural problems in the IDB member countries.

Recent developments in both the developed world and IDB member countries indicate that poor countries may no longer be able to depend as they have in the past on spillovers of new agricultural technologies and knowledge from richer countries, especially advances related to enhanced productivity of staple foods as a result of intellectual property rights that restrict technology transfer.

As a consequence of these changes, simply maintaining their current agricultural R&D policies may leave many IDB member countries as agricultural technology orphans in the decades ahead. IDB member countries may have to become more self-reliant and perhaps more dependent on one another for the collective benefits of agricultural R&D and technology.

Thus, agricultural higher education institution in IDB member countries must refocus attention on agricultural R&D as an instrument for long-run economic development to help avert a continuation of the chronic hunger and malnutrition that afflict all too many people around the Islamic world. Bearing in mind that agricultural R&D is a slow business as Pardey and Beintema note "It is the accumulation of results over the long haul that accounts for the differences in agricultural productivity observed around the world."

To this end, comprehensive strategies -- particularly advances in research and development -- are needed across the Islamic world to harness the power of science and technology in ways that not only boost agricultural productivity, profitability, and sustainability, but ultimately ensure that families become food secure and obtain the full range of nutrients that they need every day.

The research and development effort in agriculture sector must focus on the use of biotechnology and nanotechnology as well as other scientific fields outlined in the curricula section (See: 4A) to solve problems facing agricultural sector in IDB member countries. Some of the strategic research areas include the following:

- **Production of high yielding crops and plants resistant to infections, pests, drought, heat and salinity.**
- **Protection of biodiversity and natural resources and their judicious use for sustainable economic advancement**
- **Development of alternative sources of (renewable) energy including bio-energy.**
- **Means of managing natural resources for Agricultural & Rural Development.**
- **Innovative Technologies and Application in Agriculture**
- **Agricultural Production and Food Security**
- **Climatic Changes and Natural Resources Management**
- **Climate change impacts on agriculture.**

According to December 2007 report published by London-based international institute for environment and development, 31 countries out of 57 OIC member countries are among the 100 countries most vulnerable to climate change. Hunger and malnutrition caused by climate change will most probably affect those who are already poor, malnourished or dependent on local food production. The Middle East and North Africa are particularly exposed to water shortages.

- **Livestock.**

Livestock play an important role in the economy of Asian and especially in Islamic countries. Most of the people of Islamic countries are concerned with Livestock as about 20-40 percent are related directly or indirectly to the livestock production.

Livestock plays an important role in the socio-economic life of any country. It is a rich source of high quality foods such as milk, meat and eggs. It has strong potential consumers, the domestic demand for these food products are increasing rapidly; the demand often exceeding the supply. It is an important occupation and a source of family income of large number of women in rural areas. Besides providing organic manure for the soil, livestock is also an important source of several value-added byproducts of animal origin like medicine, hormones, enzymes and other industrial products. Livestock has power to transform the social and physical landscapes of developing countries. It could help relieve poverty and hunger from Islamic counties. It could provide an engine for sustainable intensification of small-scale farming and marketing. Analysts predict that demand for meat and milk will more than double in developing countries in next coming decade.

Thus, Islamic countries should concentrate on animal breed improvement, fodder crops improvement, animal nutrition, dairy production and processing, value added animal product, poultry, shed improvement, improvement in traditional practices and Animal health. Also, developing livestock requires

forage production since the biomass from the crops is insufficient and also it needs to be recycled back to the soil to reduce its deterioration. Since the soil and water resources presently available are utilized for production of human food and for industrial crops, there is neither arable land nor water available for livestock farming. Therefore, Effort should be made to utilize marginal lands and low quality (saline) groundwater for producing forage for livestock.

(D) Setting up intelligence system for promoting agriculture investment for poverty alleviation and employment creation

Information is the key to the growth of knowledge and dissemination of information is crucial for the scientific enterprise.

The Islamic intelligence system will harness science & technology for agriculture development of IDB member countries, assist industrial key players such as academic, scientific and business communities, and to function as the Islamic Technomic Brain Trust for poverty alleviation and employment creation.

It will provide an institutional set up for Islamic countries to promote the "Techonomic" approach that captures the fusion of technology and economic development for poor Islamic countries."

As innovation in technology and retail and value-added agriculture (from specialty food products to crops grown for pharmaceuticals) are giving rise to new micro- and small business, the project will serve as an instrument of sustainable rural development through the application of scientific and technological knowledge to develop and transfer innovative, sustainable technologies to rural people for income generation and to improve their quality of life.

Despite all the hype about the potentials of Science and Technology (S & T) for sustainable socio-economic development, currently there is no organised, research and development (R&D) system oriented towards poverty alleviation which is resulted mainly from unemployment problem. In the Arab world. Unemployment is 14 per cent and 15 million jobs are currently needed, with a further 74–85 million needed over the next 20 years.

Thus, in abid to promote initiatives to encourage innovation and entrepreneurship throughout the Islamic world, an intelligence system will be developed depending on well-conceived procedures for gathering, mobilizing, evaluating, sorting and communicating information with the aim to convert it into knowledge that is relevant to the need of poor Islamic countries and for creating significant new employment opportunities.

To achieve that, a mechanism will be established for screening science and technology information and cooperate with the private sector to set up commercially viable science-based enterprises with the aim to lay the foundations for science and technology-based "homegrown" entrepreneurial venture that represent an important way to build and sustain rural economy and a powerful tool for creating employment.

Expected outcome

An intelligence system containing scientific creative ideas that could be transformed into products and processes with the aim to create employment and reduce poverty. Also, models for such scientific creative ideas might be produced to be presented to the private sector.

Concept- statement of the research problem or need

On the path to development many emerging nations focused on importing scientific and technical knowledge from other countries. Following that, they try to copy and master it. Working and re-working existing knowledge rather than creating new knowledge through research is a predominant activity in innovation.

Many technologies and much knowledge are either proprietary in nature and form the subject matter of patents owned by foreign entities or published as research articles in scientific journals and is free to use.

Despite all the hype about the potentials of Science and Technology (S & T) for sustainable socio-economic development, currently organised, research and development (R&D) systems especially in poor Arab countries do not respond well to its needs. Very often poor and marginalised people across the global south do not end up benefiting from S&T. In addition, many innovations may lack the follow-through needed to move science from lab to practice.

With so much activity in science worldwide, it is, therefore, not surprising that information is available in plentiful supply from a wide range of different sources. However, information gathering and communication alone is insufficient to meet the needs of rural communities. A good intelligence function depends on well-conceived procedures for gathering, mobilizing, evaluating, sorting and communicating information with the aim to convert it into knowledge that is relevant to the need of poor Arab countries.

Thus, as military operations rely heavily on good intelligence in order to formulate campaign plans and there are many examples reported throughout history; the proposed project will establish a mechanism for screening science and technology information and cooperate with the private sector to set up commercially viable science-based enterprises with the aim to create employment and reduce poverty in rural community.

Background

Science and technology, in general, can be considered an important key towards solving the problems of socio-economic development and producing a high quality of life in which man has been transformed from a social burden to a productive contributor. Rapid technological development has fundamentally altered economic development principles, and technology is rapidly changing the way value is created and transforming the nature of dynamic competitiveness.

IDB member countries are entering a new phase of economic development with emphasis on the crucial role of the private sector and its potential impact on different branches of economy. Thus, they are urging their private sector to invest in technology in order to maintain their industrial or economic competitiveness relative to the industrialized countries.
Techonomics approach - which incorporates technology as a core driver of economic changes, and redefines the tools and strategies that can be adopted by firms, industries, or regions to improve competitive advantage and build success – could be considered as an ideal system for reducing the multidimensional phenomenon of poverty and unemployment.

Given that all 57 member states of Organization of Islamic Conference (OIC) , out of which 22 countries are belonging to the Arab world, are categorized as developing countries, poverty alleviation in the Muslim world is both evident and compelling. While the OIC countries account for 21% of the global population in 2005, they make up only 6% of global GDP.

Of the 50 Least developed Countries (LDCs) in the world today, where the majority of the populace live in extreme poverty, 22 are OIC member states and 18 of them are in Africa. Additionally, 12 OIC member states in Asia and Africa are Landlocked developing states (LLDCs) while 6 other in Asia, Africa and the Americas are Small Island Developing states (SIDs). Both these groups face need scaled-up, targeted developing assistance if they are to make progress towards the attainment of the Millennium Development Goals.

Also, unemployment in the region is 14 per cent and 15 million jobs are currently needed in the Arab world, with a further 74–85 million needed over the next 20 years.

To this end, and in line with IDB vision, innovative poverty reduction approaches to reach the poorest of the poor such as technonomis must be targeted towards a wide range of subjects from improving agricultural productivity, health, and sanitation and food security to improving education and strengthening human capacities in rural local communities. It will also promote initiatives to encourage innovation and entrepreneurship throughout the region, thus creating significant new employment opportunities and providing hope for the region's youth.

<u>Technical approach</u>
The main objective of the proposed project is to serve as the eyes and ears of the Islamic countries on the latest technological developments to lay the foundations for science and technology-based "homegrown" entrepreneurial venture that represent an important way to build and sustain rural economy and a powerful tool in economic well-being of rural communities.

To achieve that, the project will undertake research to study, develop, implement, commercialise and popularize innovative appropriate rural technologies with special emphasis on making traditional rural businesses more profitable and also on generating novel employment opprtuinties in rural areas

to stimulate and support the development of micro, small and medium-size enterprises.
The project could also provide advice to governments, donors, policy makers and researchers about new approaches, ideas and technological innovations to develop easily adaptable technology in a cost-effective manner.

To achieve the above-mentioned objectives, the project will include the following:

(1) Setting up "golden Islamic triangle for innovation"
The shortcomings of education systems in Islamic countries have been highlighted by the lack of entrepreneurship and innovation in the region. Of the top 15 countries which have submitted international applications under the patent cooperation treaty, not one of them is IDB member country.

For innovation to take root, the 'golden triangle' of academic institutions, governments and the private sector must cooperate in doing business.

To overcome that the following online database will be set up:

(A) Directory of S&T parks, incubators, and cities in IDB member countries
This directory will highlight the important role of science parks in promoting the culture of innovation and competitiveness among businesses and knowledge-based institutions. It will also promote links between scientists at universities and R&D institutions and science parks in the region with the aim to facilitate the set up and development of innovation-based companies through incubation and spin-off processes.
(B) Directory for S & T research institutes in Islamic countries.
(C) Directory for S&T associations, societies and networks in Islamic countries.
(D) **Directory for scientists and Technologists together with their Research Programmes and achievements.**
To that effect, a close cooperation with COMSTECH will be very useful, since this Institution as already established an important Database of Scientists in OIC/IDB member countries;

(2) Innovation Alliance Resources in Islamic countries
There is a growing interest in government and civil society organizations to adopt innovative poverty reduction approaches to reach the poorest of the poor. In this regard, finding approaches geared towards poverty reduction among the poor is important as it adds new ideas to donors, policy makers, and researchers to develop easily adaptable technology in a cost-effective manner.

Thus, this database will include examples of technological innovations that have been used for poverty reduction.

(3) Setting up an electronic database containing the scientific research studies that could be developed into models that empower people living in poverty.

This database will be set up by

*** Contacting scientists worldwide as well as members of science development network (SDN) which has about 30.000 members including scientists, technologists and policy makers across the 57 countries of the Islamic world.**
*** Screening science and technology journals to identify innovative ideas and explore new models and approaches that are adapted to local conditions with the aim to reduce poverty and create employment chances.**

(4) Preparing and distributing a monthly electronic bulletin to be called "innovation for empowering rural communities"
The main aims of the bulletin are the following:
*** Increasing excess to scientific research results related to solving poverty that are originating from research centers in Islamic States, patents and scientific journals.**
*** Enhancing innovative research for facing the poverty among Muslim scientific community.**
*** Encouraging private sector for investing in science and technology sector, which, in turn, will provide solutions for problem facing Islamic States, and help in improving the quality of life of the people.**
*** Assisting small and medium enterprises in technology acquisition, adoption and up-gradation to serve rural communities.**
*** Promoting a close and productivity linkage between industry and research and development institutions including universities and science and technology centers.**
(3) In abid to promote cooperation, an electronic directory for scientists and institutions working in scientific and technological approaches for poverty alleviation will be prepared.
(4) Organizing workshops and training programmes for demonstrating practical scientific ways, projects and ideas for facing poverty under local rural conditions in Arab and Islamic countries.
(5) In abid to empower innovation for poverty alleviation, exhibitions would be organized for presenting models for scientific creative ideas that could be transformed into products and processes with the aim to create employment and reduce poverty.

Measure of successful outcome
The website with the above-mentioned directories, databases and bulletin will be produced.
*** A set of scientific creative ideas that could be transformed into products and processes.**
*** A possible linkage between private sector and Arab research centers.**

(E) Establishing of agro-industry business incubator

In order to grow the IDB member countries's diversified agriculture industry, the Agri-business Incubator seeks to provide business consulting services to agriculture-related businesses throughout the IDB member countries as well as acting as a "hub" for public-private partnerships that enhances the agriculture development and commercialization of science-generated technologies and knowledge.

Besides physical incubator, "virtual incubator" will be set up to target entrepreneurs who operate in rural areas too remote to be well served by existing physical incubators.

Mission
"To facilitate creation of competencies agri-business enterprises through technology development and commercialization."

Services
It helps new entrepreneurs / enterprises with handholding services starting from business conceptualization to implementation and scaling up including the following:

- **Technology Consultancy**

Transfer of agriculture know-how from IDB member countries-based agriculture learning institutes' research findings or from other regional and international partners including:

- **Intellectual property management through identifying the best way to protect the IP using market leadership, patent, copyright and trademark**
- **Finding applications for scientific research generated in laboratories and encouraging applied research and innovation.**
- **Encouraging establishment of Small and Medium Enterprises for reducing dependence on imports and providing new goods and services for domestic and export markets.**
- **Enhance awareness for innovation in science and technology.**

- **Business facilitation**

- **Pre-feasibility studies, project appraisals, market research and techno-economic feasibility studies**
- **Facilitates entrepreneurs to participate in events and trade shows.**
- ***Access to Finance* through identification of potential grants e.g from donor programmes, government, identification of potential investors who may invest in the enterprise, help with raising bank finance and later support in presenting to venture capital firms.**

- **Training**

Organizes entrepreneurship programme that provide technical business and general industry workforce training, with entrepreneurship focus; skill upgrades and business management training courses.
NOTE:
A close cooperation with COMSTECH will be very useful, since this Institution has recently established Virtual incubator for science-based business (VISB) http://www.visbdev.net/visbdev/new/

(F) Setting up "Initiative for strengthening capacities in agriculture policy-making."

This initiative should assists IDB member countries in formulating their science-based sustainable agriculture development policies, agriculture higher education strategies and plans as well as in the reform of their science and technology

(S&T) systems by bringing to light policy options for the governance of S&T systems in the new context, supporting participatory policy formulation and/or reviews to improve the management of S&T effort at the national level.

This could be done by doing the following:

- **Setting up a online database for agriculture development strategies in IDB member countries as well as regional and international organizations.**
- **Providing guidelines and methodologies, technical advice and guidance on formulation, implementation, monitoring, and a review of policies and plans concerning national agriculture development activities.**
- **Training parliamentarians, managers, decision-makers and government officials in agriculture development policy to ensure that they exercise legislative control and contribute effectively to the development of S&T-related aspects of public policies as well as strengthening their capacities in agriculture policy-making.**
- **Setting up a forum to discuss how "Agriculture Higher Education" should be structured and organized within the IDB Member countries. For example, can it operate as "Centres of Excellence" specialized each in specific field, operating as hubs and connected with "antennas" focussed on sub-regional and specific interests.**

  It could also discuss ways to establish performant, innovative and competitive agriculture in IDB member countries to face challenges resulting from current world trade, deriving from globalization and liberalization and submitting agricultural products of the Ummah to a severe competition, even in their own national, sub-regional or regional markets. This could be done through innovative dynamics with full consideration and utilization of scientific and technological achievements, as well as rationalized traditional/local knowledge, for a modernized agriculture.

<u>(J) Setting up Islamic Agropedia…. an online repository of agricultural education for all</u>

This initiative will establish agricultural technology popularization system to speed up the awareness of agricultural application of advanced technologies and the value of indigenous knowledge with specific focus on its role on promoting sustainable agriculture and economic development of IDB member countries.

This will be done by developing an online Islamic repository of agricultural information to be called Islamic Agropedia.

It aims to disseminate crop- and region-specific information to farmers and agricultural extension workers — who communicate agricultural information and research findings to farmers — and provide information for students and researchers.

The website content will be continually added and validated through review and analysis by invited agricultural researchers, in a manner similar to that used by Wikipedia and using open source tools.

Islamic Agropedia could be a global leader in promoting innovative ways of using technology for farm and rural outreach through internet or as a basis for radio plays.

5. Implementation of the action plan

The components of the action plan will be implemented in the following phases:

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Phase I: Information, communication and intelligence systems

- **Components**

This phase will put the foundation for the next phases by setting up the following information sources.

(A) Developing of on-line directory for agriculture science education resources for IDB member countries.
(B) Setting up Islamic agropedia …an online repository of agriculture education for all
(C) Setting up intelligence system for promoting agriculture investment for poverty alleviation and employment
(D) Agricultural Education and Training Portal in IDB member countries
(E) Online database for agriculture development strategies

- **Duration**

The expected time frame for this phase is one year.

- **Who will develop and maintain the proposed electronic /information systems?**

The electronic information systems will be developed and hosted at the website of Quick Win (QW) project.

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Phase II: Curricula improvement and R&D priority

- **Components**

This phase will include the following:
(A) Development of locally relevant and multidisciplinary curricula.
(B) Developing of independent and locally driven R&D agenda for tackling the major agricultural problems in the IDB member countries.

- **Duration**

The expected time frame for this phase is one year.

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Phase III: Linkages with local, national, regional and international partners

- **Components**

List of potential partners working in agriculture will be prepared and possible linkage will be attempts.

- **Duration**

Preparing for this phase will start with the first phase.

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Phase IV: agriculture capacity development at various levels

- **Components**

This phase will include the following:

(A) Capacity development at the targeted communities' level
- **Agri-business and industry community**
- **Farmers community**
- **Agriculture policy makers**
- **Public community**
- **Research and development community**
- **Agriculture education community**

(B) Organisational capacity building could include
- **Strategy development**
- **Resource mobilisation.**

(C) Inter-organisational capacity building could include:
- **Relationship building**
- **Networking**
- **Strategic alliance development**
- **Partnership development**
- **Donor relationship building**

(D) Societal capacity building might involve;
- **Policy analysis**
- **Working with government**
- **Improving relationships with the public**

(E) Establishing agro-industry business incubator

- **Duration**

The expected time frame for this phase is two years.

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