Higher education and science & technology in IDB member countries

Present development and future prospects

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Summary

The scientific progress achieved at the end of last century has spawned another economic revolution, like the industrial revolution, that is transforming our everyday life and producing radical changes in the global economic landscape. For example, information technology is effectively eliminating national borders around the world and the emerging fields in biotechnology and nanotechnology will lead to unprecedented understanding and advancement of industrial and service sector, through the introduction of new products and processes.

While knowledge-based industries is reshaping our lives and economic activities, the Muslim scientific and technological experience went through a golden age in the tenth through thirteenth centuries, a subsequent collapse, a modest rebirth in the nineteenth century, and a history of frustration in the twentieth century. The deficiency in Muslim science and technology is particularly intriguing given that Muslims were world leaders in science and technology a millennium ago.

As knowledge becomes more important, so does higher education. In today's world economy, workers need not just a college degree in a specific subject but also need to be resourceful, skillful, and able to quickly identify and solve problems. These strengths can only be cultivated in quality universities at the center of first-class higher education systems.

In this report, the role of higher education and innovation for economic growth is emphasized, the status of science and technology within the higher education sector is presented including the position of universities in member countries of Islamic development bank (IDB) in the regional and international ranking and some present development in higher education and knowledge-based industries in IDB member countries is highlighted.

1. Introduction

Education in all its forms plays an indispensable role in addressing the critical challenges of sustainable development. Higher education, in particular, has a catalyst role for sustainable development and the building of a learning society. It has a special responsibility to conduct the scientific research necessary to generate the new knowledge needed and train the leaders and teachers of tomorrow, as well as communicate this knowledge to decision-makers and the public-at-large.

It has a vital role to play in shaping the way in which future generations learn to cope with the complexities of sustainable development. Universities and higher education institutions educate highly qualified graduates and responsible citizens able to meet the needs of all sectors of human activity.

Education is a critical sector whose performance directly affects and even determines the quality and magnitude of development in IDB member countries. It is

the most important means we have at our disposal to develop human resources, impart appropriate skills, knowledge and attitudes. Education forms the basis for developing innovation, science and technology in order to harness our resources, industrialise, and participate in the global knowledge economy and for the Islamic world to take its rightful place in the global community.

An educated citizenry is vital to implementing informed and sustainable development. In fact, a national sustainability plan can be enhanced or limited by the level of education attained by the nation's citizens.

Nations with high illiteracy rates and unskilled workforces have fewer development options. For the most part, these nations are forced to buy energy and manufactured goods on the international market with hard currency. To acquire hard currency, these countries need international trade; usually this leads to exploitation of natural resources or conversion of lands from self-sufficient family-based farming to cash-crop agriculture. An educated workforce is key to moving beyond an extractive and agricultural economy.

2. Education ….A cornerstone for development

Today, the *Ummah* is going through a very crucial stage in its human capital development. According to statistics provided by the UN, only six Islamic countries fall in the high human development index (HDI), 22 in the medium and as many as 23 in low HDI category. The highest-ranking Islamic country is 36th while the lowest 173rd, in the HDI list of 178 countries.

It is a fact that education is the cornerstone of development, as has been proved by nations like Japan, Korea, Hong Kong, Singapore and Taiwan. They have all made considerable investment in education, they achieved rapid economic growth with a significant and positive impact on employment, earning, productivity, health and national well being.

In this increasingly globalized world, knowledge is fast replacing physical resources and cheap labor as the driver of growth.

Advances in technology are changing the way people work and live, and industrialization depends increasingly on innovation, planning, technology and management—skills only available from a highly educated work force.

IDB member countries should not continue to be a group of developing countries forever and getting to a higher status requires the improvement of their abundant resources that are human capital.

Thus, as required by Islam, there is a pressing need for an educational strategy for the development of higher education in the Islamic world in accordance with Islam. The first verse of the Quran that was revealed to Prophet Muhammad (pbuh) was, “Iqra!” “Read in the name of thy Lord who creates.” This is in fact the beginning of the quest for knowledge, which emphasized the importance of learning in human life.

3. Status of science and technology in IDB member countries

Despite the fact that the Muslim world is blessed with enormous natural resources like: fertile lands, water, gold, oil, uranium, minerals and hard working masses, a vast majority of Muslim countries have yet to deliver the goods to their people.

The deficiency in Muslim science and technology is particularly intriguing given that Muslims were world leaders in science and technology a millennium ago.

The entire Muslim world constituting one-fifth of humanity, contributes barely 1000 research articles out of 100,000 science books and 2,000,000 research articles published annually. While the West has an average of 3000 science PhDs per million of its inhabitants, the number in IDB member countries is so dismally small that not even the statistics are available.

Countries that are predominantly Muslim are characterized by low spending on science, small scientific communities, and poor-quality universities. The 57 predominantly Muslim countries have about 23 % of the world's total population but less than 1% of its scientists who generate less than 5 % of its science and make barely 0.1 % of the world's original research discoveries each year. The Islamic countries have a negligible percentage of patent registrations in US, Europe and Japan. Even more serious is the fact that the Research and Development manpower of Muslim countries is only 1.18% of the total science and **technology** manpower.

Only two scientists from Islamic states have won Nobel Prizes, Abdus Salam, a Pakistani (Physics, 1979) and Ahmed Zewail, an Egyptian (Chemistry, 1999). Both carried out their research outside Islamic countries. Today's Muslim societies have generated few scientists of international repute.

Thus, the irony is that in skills and professional manpower we are not totally handicapped as we have many among our own people who are highly qualified professionals but more often than not such Muslim experts end up serving in the West due to the obstacles and predicaments they face in their own home countries.

Furthermore, Islamic countries, as a whole, have approximately 275 researchers per million population against 850 per million in the developed West. But even among the Muslim countries, there are regional imbalances. The ratio works out to only 100

researchers per million African Muslims, 445 for one million Arab **populations** while for Asians it is 569 researchers per million people.

The disparity between the Third World and Muslim nations in the number of scientists and engineers is quite striking. Despite similar levels of development, there are more than twice as many scientists and engineers in the Third World as in the Muslim countries, and almost eleven times as many in the **industrialized** nations. Muslims account for 23 percent of the world's population, but less than one percent of its scientists.

The rate of enrollment in higher education for Muslim is fully 45 % lower than that for the Third World countries, a state of affairs that could be regarded stunning.

Of the 28 lowest producers of scientific articles, according to the US National Science Foundation in 2006, half are IDB member countries. In 2003, the world average for production of articles per million inhabitants was 137; the average of IDB member countries was only 13 with the highest publication rates being in Turkey and Iran. And according to the World Bank Development Indicators of 2006, the IDB member countries produce so few patents that they are invisible on a bar chart in comparison with other countries.

4. Higher education ….the only road to innovation-based economic development

Knowledge Based Industries (KBI) are industries that are primarily based on scientific knowledge, innovation and pioneering technology.

The benefits of any knowledge economy or particularly (KBI) are in three folds namely Human Resources, Innovation and Growth. Better human resources leads to superior innovations, which lead to greater economic growth

Human capital is the central pillar of any developmental activity. The focus on KBI is basically to enhance the quality of labor to learn and adopt newer technology for better productivity.

Innovation in product, process and organizational structure transforms the future of any industry.

As economies become more knowledge based the obvious route for the industries to follow is a science based strategy.

The key for the industries to get the full benefits of innovation is openness towards international flow of knowledge and accommodating it through all means.

Countries in the Middle East face a major challenge of reforming higher education so that it gives graduates stronger competence as innovators, according to new economic report published by National bank of Dubai (NBD) on December 2007.

Graduates play a key role in linking higher education with a country's economic development through their innovative activities, and higher education policy must be in step with a wider set of innovation policies.

"Innovation is considered to be the most important driver of growth in the knowledge-based economy through its direct impact on technological progress and higher productivity. In developing countries, it is regarded as a major pillar of economic development," said the NBD report.

"We expect the contribution to economic growth from investment in higher education to be modest in a stationary economy and high in an economy with a high rate of technical and organizational change," the report added.

For example, Arab Gulf countries in the past few years have increased the share of engineering and science students in the total of higher education students, in an attempt to create innovators in their economies.

According to NBD, in Bahrain 51.3 per cent of the total higher education students are enrolled in science and engineering, while Kuwait and the UAE boast 29 per cent and 21.5 per cent shares of students in the subjects, respectively.

Oman, at 18.6 per cent, has the lowest percentage of engineering and science students as part of the total higher education shares.

The NBD report indicated that countries must invest significant shares of their income in research and development in order to keep the pace of innovation and technological progress.

In 2005, Finland invested the highest percentage of its GDP – at 3.5 per cent – in research and development, among Singapore, Korea, the United Kingdom (UK), and the United States.

The US invested 2.7 per cent of its income, while Korea trailed behind at 2.6 per cent and Singapore at 2.3 per cent. The UK showed the lowest investment – at 1.9 per cent – in research and development among the five countries.

Studies have shown the marginal productivity of the highly educated will reflect the rate of technical change – in other words, the rate of return on investment in higher education is positively linked to the rate of technical progress.

This is why high rates of unemployment among graduates may be seen as reflecting economies where there is little technical progress, NBD said in its report.

Studies show the first-time hiring of a graduate with an engineering background has a significant positive impact on the tendency to introduce a new product.

However, owners of small family-dominated companies are reluctant to hire what they see as “alien academics”, while graduates are interested in an environment where they can interact with others, the report said.

According to the report, low demand for graduates in the private sector reflects cultural barriers that restrict the hiring of graduates. “The absence of graduates reduces the innovative capability of firms which leaves the industry in stagnant mode where demand for graduates remains modest.” There is a need for government initiative to stimulate demand for the first graduate hired in the firm, NBD added.

5. Ranking for universities in IDB member countries

5.1 international ranking

Today, higher education has become globalized as more and more universities or higher educational institutions (HEIs) throughout the world are focusing special attention on internationalization, educational linkages, research and academic collaboration, etc., so as to be recognized as HEIs which offers world class education.

However, it is noted that most of the Muslim universities do not have sufficient educational links or contacts between them. It is therefore very important that positive steps be taken to develop linkages/contacts, especially for the development of institutional teaching, research, and other academic services between educational and research institutions of the Muslim world. The Muslim Ummah must realize the demands of the 21st century and give due importance to education, and thereby lay the groundwork of constructive, dynamic and meaningful change among the minds of our youth through education.

At present there are 57 Muslim States, members of the IDB , and the total number of universities and institutions of higher education and research in the Muslim world is only just above 1000 (The Federation of Universities of the Islamic World has membership of 217 universities).

5.1.1 Shanghai Ranking 'Academic Ranking of World Universities'

The much-publicized academic ranking of the world universities complied by the shanghai Jiao Tongo university, which was a large-scale Chinese project to provide independent rankings of universities around the world primarily to measure the gap between Chinese and world-class universities.

The Shanghai ranking uses a weighted composite sum. Shanghai appraises education and faculty based on Nobel- and Fields-winning alumni/faculty and highly-cited researchers. It measures research by counting non-review articles in *Nature* and *Science*, and the total number of published articles. Also, a weighted average of these indicators is adjusted for institutional size and contributes 10% to the final sum.

One of the primary criticisms of the ranking is its bias towards the natural sciences, over other subjects and science journals in the Anglosphere. This is evidenced by the inclusion of criteria such as the volume of articles published by *Science* or *Nature* (both Journals devoted to the natural sciences published in English), or the number of Nobel prize winners (which are predominantly awarded to the physical sciences) and fields Medalists (mathematics).

According to 2007 academic ranking of the world universities, the only 2 universities from Islamic world that are listed in the top 500 universities are the following:

World rank	Institutions	Region	regional rank	Country	national rank
402-508	Univ. Istanbul	Asia-Pac	65-99	Turkey	1
http://www.istanbul.edu.tr/english/					
402-508	Cairo Univ.	Africa	3	Egypt	1
http://www.cu.edu.eg/english/					

5.1.2 The Times Higher Education Supplement 'QS World University Rankings'

THES, a British publication, in association with Quacquarelli symonds, annually publishes the THES-QS world university rankings, a list of 400 ranked universities from around the world.

The Times ranking is a composite system. The ranking assigns much weight (40% of total) to an expert opinion survey. Additional components address the rating from graduate recruiters, recruitment of international faculty, the enrollment of international students, the student to faculty ratio, and total citation counts.

QS ranking faces criticism due to the more subjective nature of its assessment criteria, which are largely based on a "peer review" system of 1000 academics in various fields.

According to 2007 QS World university rankings, below are the Muslim universities mentioned in the list of top 400 universities.

Rank	institutions	country
307	University Sains Malaysia	Malaysia
309	University Kebangsaan Malaysia	Malaysia
304	University Putra Malaysia	Malaysia

369	Bandung institute of technology	Indonesia
390	Istanbul Technical university	Turkey
395	University of Indonesia	Indonesia

5.1. 3. Webometrics of world universities

It is produced by Cybermetrics Lab (CINDOC), a unit of the National Research Council (CSIC), the main public research body in Spain. It offers information about more than 4,000 universities according to their web-presence (a computerised assessment of the size and sophistication of the website).

The Webometrics Ranking is built from a database of over 13,000 universities and more than 5,000 research centers. The Top 4,000 universities are shown in the main rank, but even more are covered in the regional lists. Institutions from developing countries benefit from this policy as they obtain knowledge of their current position even if they are not World-Class Universities.

The ranking started in 2004 and is based on a combined indicator that takes into account both the volume of the Web contents and the visibility and impact of this web publications according to the number of external inlinks they received. The ranking is updated every January and July, providing Web indicators for universities and research centres worldwide. This approach takes into account the wide range of scientific activities represented in the academic websites, frequently overlooked by the bibliometric indicators.

Webometric indicators are provided to show the commitment of the institutions to Web publication. Thus, Universities of high academic quality may be ranked lower than expected due to a restrained web publication policy.

According to webometrics ranking of world universities, here is links to the following:

- 100 top universities in the Middle East and North Africa region.
- Top 100 universities in Asia-pacific region
- Top 100 universities in Indian subcontinent region

5.1.4. Scientific research performance ranking

It is different from QS World University ranking by Time Higher Education Supplement which focuses on university ranking, and the academic ranking of the world universities by Shanghai Jiao Tong University which focuses on academic ranking.

It evaluates and ranks the scientific papers performance for the top 500 universities worldwide.

The performance measures are composed of nine indicators to assess a university's overall scientific paper performance along three criteria: research productivity (account for 20%), research impact (30%) and research excellence (50%).

The emphasis on current research performance makes the indicators a fairer one than some traditional indicators such as a university's reputation or the number of Nobel Prize winners affiliated with that university, which tends to favor universities with longer histories or universities in developed countries.

Although many institutions from developing countries such as Mexico, Brazil, India, South Africa and Argentina were included in the top 500 universities of 2007 performance ranking of scientific papers, no single university from the 57 Islamic countries was mentioned.

Link to 2007 performance ranking of scientific papers
http://www.heeact.edu.tw/ranking/EngTop100.htm

5. 2 Regional ranking

5.2.1 SESRTCIC Ranking

A preliminary report on the academic rankings of universities in the OIC prepared by the Turkish-based Statistical, Economic and Social Research and Training Center for Islamic Countries (SESRTCIC), an OIC affiliate, showed the top 20 universities based on the number of articles published in 2004-2006 to be Turkey, Iran, Egypt, Kuwait and Malaysia, but the ranking in terms of citations per article are universities in Indonesia, Yemen, Uzbekistan, Iraq and Mozambique.

Another ranking in the report based on a composite index (research quality, research performance, research volume and rate of growth for research quality) showed the top 20 universities to be in Iran, Turkey, Egypt, Malaysia, Pakistan, UAE, Kuwait and Lebanon. The top ranked Saudi university, King Fahd University of Petroleum and Minerals, came in at 31 followed by King Saud University at 71.

The research was conducted by SESRTCIC to realize the OIC Ten-Year Programme of Action targeted at facilitating the placement of OIC universities among the top 500 universities in the world.

The ranking of universities in the OIC member countries was announced in a seminar held in Tehran on 29-30 April 2007 under the title: "Global repositioning of OIC Universities"

The ranking is based on objective measurements and includes a number of rankings based on different criteria widely used in this area such as:
Internationally comparable data accessible to verification and objective quantitative criteria

The Number of articles published by all universities in the period of 2001, 2004-2006 and number of citations received by these publications and a combination of both
The data from the database of the Institute for Scientific Information (ISI Articles published in journals indexed in Science Citation Index Science Citations Index Expanded) Social Science Citation Index) ISI Web of Knowledge

The ranking was done first for 323 of 1700 universities in the OIC based on single factor ranking. Then, 85 of 323 universities were analyzed for ranking by the composite index.

Based on this process, the UAE University is being ranked as

- The first in the Gulf Region among GCC countries;
- The second in the Arab world; and
- The ninth in the Islamic countries.

Top 20 universities by the composite index

Rank	University		Country
1	Koc University	http://www.ku.edu.tr/main.php	Turkey
2	Quaid-i-Azam University	http://www.qau.edu.pk/	Pakistan
3	Razi University	http://www.razi.ac.ir/	Iran
4	Tarbiat Modares Univ.	http://www.modares.ac.ir/	Iran
5	University Tabriz	http://www.tabrizu.ac.ir/	Iran
6	Hacettepe University	http://www.hacettepe.edu.tr/english/	Turkey
7	Suez Canal University	http://scuegypt.edu.eg/	Egypt
8	Univ. Kebangsaan Malaysia	http://www.ukm.my/ukmportal/	Malaysia
9	United Arab Emirates University	http://www.uaeu.ac.ae	UAE
10	Kuwait University	http://www.kuniv.edu.kw/	Kuwait
11	Istanbul University	http://www.istanbul.edu.tr/english/	Turkey
12	American University of Beirut	http://www.aub.edu.lb/	Lebanon
13	University Malaya	http://www.um.edu.my	Malaysia
14	Inonu University	http://www.inonu.edu.tr/univeng/	Turkey
15	Amirkabir Univ. of technology	http://www.aut.ac.ir/	Iran
16	Cukurova University	http://www.cu.edu.tr/Content/Asp/English/index.asp	Turkey
17	Bu-Ali Sina University	http://www.basu.ac.ir/	Iran
18	Shiraz University	http://www.shirazu.ac.ir/index.php	Iran
19	University of Tehran	http://www.ut.ac.ir/en/index.htm	Iran
20	Cairo University	http://www.cu.edu.eg/english/	Egypt

5.2.2 COMSTECH Ranking

Top 25 Most Productive Universities in the Muslim World*			
University		Country	Publications**
1.	University Hacettepe http://www.hacettepe.edu.tr/english/	Turkey	8,979
2.	University Istanbul http://www.istanbul.edu.tr/english/	Turkey	6,488
3.	Ankara University http://www.ankara.edu.tr/english/	Turkey	5,982
4.	Cairo University http://www.cu.edu.eg/english/	Egypt	4,977
5.	Kuwait University http://www.kuniv.edu.kw/	Kuwait	4,495
6.	King Saud University http://www.ksu.edu.sa/sites/ksuarabic/Pages/Home.aspx	Saudi Arabia	4,336
7.	Middle Eastern Technical University http://www.metu.edu.tr/	Turkey	4,215
8.	Gazi University http://www.gazi.edu.tr/english/indexeng.php	Turkey	3,652
9.	Istabul Technical university http://www.metu.edu.tr/	Turkey	3,452
10.	Ege University http://www.ege.edu.tr/	Turkey	3,336
11.	King Fahd University of petroleum & minerals http://www.kfupm.edu.sa/	Saudi Arabia	3,323
12.	Ains Shams University http://net.shams.edu.eg/History.asp	Egypt	3,129
13.	University Malaya http://www.um.edu.my/	Malaysia	2,862
14.	National Research Center http://www.nrc.sci.eg/Default.asp	Egypt	2,651
15.	Alexandria University http://www.alex.edu.eg/	Egypt	2,628
16.	American University of Beirut http://www.aub.edu.lb/	Lebanon	2,568
17.	Ataturk University http://www.atauni.edu.tr/	Turkey	2,535
18.	United Arab Emirates University http://www.uaeu.ac.ae/	UAE	2,478
19.	Mansoura University http://www.mans.eun.eg/	Egypt	2,439
20.	King Faisal Research Center http://bportal.kfshrc.edu.sa/wps/portal/RC	Saudi Arabia	2,434
21.	University Sains Malaysia http://www.usm.my/en/	Malaysia	2,402
22.	Dokuz Eylul University	Turkey	2,389

	http://www.deu.edu.tr/DEUWeb/English/		
23.	Uzbek Academy of Science http://eng.uzsci.net/academy/	Uzbekistan	2,169
24.	Cukurova University http://www.cu.edu.tr/Content/Asp/English/index.asp	Turkey	2,026
25.	University of Tehran http://www.ut.ac.ir/en/index.htm	Iran	1,962

*Source: COMSTECH

** Ten-year Publication Rate (1995-2005)

6.Higher education and knowledge-based industries in IDB member countries….future prospects

The shortcomings of science education systems in IDB member 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 are Muslim country.

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

A number of IDB member countries have already started to promote the culture of innovation and competitiveness among businesses and knowledge-based institutions and 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.

6.1. Iran …..a new world leader in science and technology

Iran stands 11, 13, 15, 19, 22 and 32 in the world rankings of the scientific fields of math, mechanic, polymer, chemistry, chemical engineering and physics, respectively. Iran published 9,000 ISI papers in international scientific journals in 2007, showing a 17% growth rate.

Iran in cooperation with the United Nations Industrial Development Organization (UNIDO) plans to set up an UNIDO center for South-South Industrial Co-operation in Tehran.

The center will promote south-south cooperation in science, manufacturing, technology, and industrial innovation as well as providing assistance to developing countries in their efforts to strengthen their scientific, technological and innovative capacities.

A proposal for establishing Asian institute for scientific research and technology

The proposed institute will be responsible for identifying technological, research and scientific capacities of Asian countries and collecting and disseminating information in this respect. It will also hold seminars and conferences and establish inter-governmental joint research centers with the participation of Asian countries in proportion to their capacities. Iran has proposed the establishment of an Asian scientific, research.

6. 2. Saudi Arabia ranked 7th in higher education

British magazine The Economist has placed Saudi Arabia on seventh place ahead of France, Russia, Italy, Spain, Malaysia and many other countries in the field of higher education and scientific research

Several factors helped in enabling the Kingdom to occupy this position. The amount spent on each student in the field of higher education, the percentage of allocations for higher education in the general budget, the total number of external students, and the number of business administration institutes were among the other criteria for making the Kingdom occupy top position.

Higher education in the Kingdom witnessed great developments during the past four years.

The latest in the effort to develop higher education was the approval to convert the two college complex projects in Arar and in Rafha into an independent university called the Northern Frontier Region University. This was preceded by the announcement to establish universities in Jizan, Najran, Al-Baha, Hail, Al-Jouf and Tabuk. The cost for carrying out the first stage for construction reached SR5 billion.

The number of government universities has reached 20 from eight four years ago.

Every region now has an independent university while some regions have more than one, depending on the need and the population density.

A sum of SR8 billion has been allocated from the budget surplus to establish new universities and colleges.

The Ministry of Higher Education also supported private universities and colleges. There are three private universities and 17 private colleges.

At the medical and scientific level, during the past three years the number of colleges of medicine, dentistry, pharmacology, applied medical sciences and nursing rose from 16 to 50.

The number of colleges of engineering, science and computers has risen from 16 to 57. Likewise, the number of community colleges rose from four to 30. The number of

university hospitals rose from three to 12. The number of governorates having university education increased to 59.

Another significant initiative is the launch in Fall 2009 of a graduate university in Saudi Arabia, The King Abdullah University of Science and Technology (KAUST), which will have a US $ 10 billion endowment – the sixth largest in the world.

6.3 Malaysia to lead South-South collaboration

The UN has announced an international centre for South-South cooperation in science, technology and innovation based in Malaysia.

The plan was approved by the executive board of UNESCO (UN Educational, Scientific and Cultural Organization) on 24 April 2007.

The centre — to be run by the Malaysian Ministry of Science, Technology and Innovation — will seek to create a network of national centres of excellence. This will promote research collaboration, technology transfer and the development of industries in fields such as information technology, biotechnology and nanotechnology.

It will also offer fellowships to scientists, institution managers and policy makers to attend training in science policy making.

The centre will be initially located at the Academy of Sciences Malaysia in Kuala Lumpur, before relocation to its own facility.

6.4 Libya….and ground water research.

UNESCO has also agreed to establish a centre in Libya to encourage networking and the transfer of knowledge between scientists from Africa and the Middle East.

The centre will promote scientific research, education, and sustainable development in the region. In particular, it will help develop policies to promote and coordinate cooperative research on technology to access shared groundwater.

6.5 'Higher education city' in Bahrain … a boost for Middle East science

Bahrain has announced plans for a centre to promote science, technology and innovation in the Middle East.

The facility, to open by early 2010, will eventually include laboratories, an international centre for research, a specialist academy as well as a branch of a United States-based university.

It would provide students with the engineering skills needed to serve the energy and key economic sectors, as well as offer much needed courses in the business and science disciplines.

6.6 The Dubai International Academic City

It will comprise universities and research and development centres from developing countries, such as India, Iran and Pakistan, as well as industrialized countries, such as Australia, Belgium and the United Kingdom.

Plans for a science 'plaza' in Abu Dhabi. The Plaza of Intelligence and Innovation City will promote science-related activities and include a research centre for space sciences, a space and science museum and an academy for maths and science teachers.

6.7 Foundation to narrow 'Arab knowledge gap'

The prime minister of the United Arab Emirates has announced the creation of a US$10 billion foundation to narrow the gap in scientific knowledge between Arab states and the developed world.

The Mohammed bin Rashid Al Maktoum Foundation will be based in the United Arab Emirates.

Starting later this year, the foundation will establish scientific research centres in Arab universities, offer research grants to Arab researchers and from 2008 will provide scholarships to students.

It will undertake concrete initiatives to encourage innovation and entrepreneurship throughout the region, thus creating significant new employment opportunities and providing hope for the region's youth.

7. Conclusion

Today, only a small number of industrialized countries provide practically all of the worlds' technology innovation. They are therefore uniquely positioned in the landscape of the world economy. Countries that do not join this race immediately will miss the opportunity to share in the benefits of innovation, and will inevitably slip in their economic and industrial performance and rankings.

It is therefore imperative to devise a comprehensive **Knowledge Based Industries** plan for the IDB member countries to retain the competitiveness of its economy into the 21st Century and to diversify into productive activities outside the traditional gas, oil, and raw material sector.

This initiative hinges critically on the support and the leadership of enlightened policy makers for several reasons. First, policy frameworks and economic foundations can either stimulate or constrain innovation.
Second, individual companies are not in a position to provide all the capital needed for the investments. Third, the contributions from academia, laboratories, industry and financial sectors need to be strengthened and coordinated to avoid duplication and expending resources and energies on too many fronts.

There are indeed steps in the right direction and the region's leadership should be congratulated on this renewed focus on higher education.

Besides the ten-year action plan for OIC member countries, the Arab states Arab leaders have approved a ten-year plan for scientific research and development.

This plan was signed off at a two-day summit of the 22 member nations of the Arab League in Riyadh, Saudi Arabia this week (28-29 March).

The plan calls on Arab countries to spend 2.5 per cent of their gross domestic product (GDP) on research and development over the next ten years. At present, Arab nations only spend 0.15 per cent of their collective GDP on research and development — well below the global average of 1.4 per cent.

Arab states have also agreed that they should spend at least seven per cent of their GDP on education, including science and technology teaching programmes.

They plan to increase the peaceful use of nuclear energy by establishing national authorities to monitor the use of nuclear energy more transparently. They will build nuclear reactors for scientific research, and expand the role of nuclear science in educational, economic and medical activities.

Arab leaders agreed to make education and scientific research a permanent item at all future Arab summits.

However, much is still needed to be done at the grass root level as well as implementing with quality the planned education investments.