

SUSTAINABILITY AND THE ECONOMY

Higher Education in Science and Technology--A Silent Revolution

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We now live in a world in which knowledge has become the key driver for socio-economic development. Only those countries are able to march forward and progress rapidly which invest in their human resources, tap into the creativity of their young and harness their potential for development. Human resources therefore need to be adequately trained so that they can play their due role to develop a knowledge economy in the highly competitive global environment.

Stunning advances made in the last few decades in the fields of information technology, biotechnology, material sciences, health sciences, renewable energy and other disciplines are rapidly changing the face of the globe, leading several countries on the path of social and economic development, leaving others behind.

Since its inception, the Higher Education Commission has undertaken a systematic process of implementation of an agenda for reform outlined in the HEC Medium Term Development Framework (MTDF), in which Access, Quality and Relevance have been identified as the key challenges faced by the sector. To address these challenges a comprehensive strategy was defined that identified the core strategic aims for reform as (i) Faculty Development (ii) Improving Access (iii) Excellence in Learning and Research and (iv) Relevance to National Priorities.

ATTRACTING THE BRIGHTEST

- ***Salaries of Academics Three Times Higher than Federal Ministers!:*** A revolutionary step has been taken in Pakistan to increase the salary structures of faculty members in universities so that they are three times higher than those of Federal Ministers in the Government! This will help to attract the brightest students in Pakistan, which has about 100 million people below the age of 25, to choose education and research as their first option. This will allow the country to benefit from this huge pool of creativity. The new Tenure Track System involves regular international assessment before grant of permanency.
- ***Reversing the brain drain:*** A massive programme has been initiated to attract eminent Pakistani scientists, engineers and academics to return to Pakistan from technologically advanced countries and be absorbed into local universities. About 300 such eminent persons, who have lived most of their lives in the West, have already returned. Through a process of clustering, Centers of Excellence in different fields are being developed using their expertise and knowledge.

- ***Linking emoluments to performance:*** Pakistan is probably the only country in the world where a young researcher can today have a much higher pay than a more senior but less productive person in the same department. The research productivity allowance introduced by me measures the output of scientists and engineers in the form of Impact Factors in science journals, citations in the Science Citations Index and other such yardsticks and gives financial rewards to the most productive authors.

TRAINING THE BRIGHTEST

- ***PhD Scholarships -- Unleashing the Potential of Our Youth:*** The Foreign Scholarship Programme is geared towards strengthening the research base in areas of national relevance, particularly relating to engineering, applied and pure sciences. About 500 scholars are being sent abroad annually to universities in Germany, France, Sweden, Austria, Netherlands, UK, US, Australia and New Zealand. This number is being expanded to a thousand a year. Pakistan has the largest Fulbright Scholarship Programme (US \$ 150 million) in the world with the US assistance whereby 640 Pakistani students will be able to study for Masters and PhD level training in Ivy League universities in USA.
- ***Indigenous Scholarships:*** Ample opportunities are now available for the youth to realize their potential through yet another programme for doctoral studies while residing in Pakistan whereby they avail a monthly stipend apart from study leave, full course and supervisor fee all paid by the Higher Education Commission.
- ***Postdoctoral Fellowships:*** Under the Postdoctoral Fellowship programme, over 255 scholars have been placed at premier academic and research institutions abroad for periods of 9-12 months.

USING TECHNOLOGY TO LEAP FROG

- ***Sky is No Longer the Limit:*** The revolutionary Pakistan Educational and Research Network (PERN), a fibre based intranet, has extended its reach to 60 universities and provides internet connectivity of 155MB across the network. As a full voting member of the Asia Pacific Advance Network Consortium (APAN) PERN is also enhancing its functionality by providing connected universities with additional applications such as video conferencing and Voice Over IP services for communication between connected universities.
- ***Virtual University Programmes:*** The Virtual University, Pakistan's first university relying completely on modern Information and Communication Technologies, was established by the Government as a public sector, not-for-profit institution to provide affordable world class education to aspiring students all over the country. Using free-to-air satellite television broadcasts and the Internet, the Virtual University allows students to follow its rigorous programmes regardless of their physical locations.
- ***MIT Mirror website/MIT Open Courseware:*** Higher Education Commission has launched a mirror site of Massachusetts Institute of Technology Open Courseware on PERN which is available with its resources, free of cost, on the HEC website and enables open sharing of the faculty's materials and pedagogy with educators and learners around the world. This initiative connects visitors with the syllabi, lecture notes etc. of 914 courses. A set of

CDs containing MIT courses, including actual lectures as delivered by MIT professors, have been provided to various departments in universities all over the country.

- ***International Video Conferencing Programme:*** An international lecturing programme through video conferencing will become operational this November and students in Pakistan will attend lectures interactively delivered from top universities in Western and technologically advanced countries around the globe. Over 700 lectures by Nobel Laureates and top professors have already been lined up to be beamed into Pakistan's lecture theatres.
- ***Digital Library:*** The Digital Library Programme of HEC now provides unparalleled free online service of over 20,000 international journals from the world's leading publishing houses to universities and R&D organizations across the country.
- ***PAKSAT I:*** Pakistan placed its first education satellite in space in 2003 which is used for educational purposes. It is home to two educational channels and will soon be launching two additional educational satellite TV channels.

ESTABLISHMENT OF NINE ENGINEERING UNIVERSITIES

Demographic changes taking place in Europe and other countries offer huge opportunity for countries such as Pakistan. In many technologically advanced countries the older populations are getting older and the younger populations are not opting for sciences/engineering, thereby creating a vacuum of qualified technical manpower for industrial countries. Pakistan plans to set up nine engineering and three technology universities which will soon become operational in collaboration with Germany, France, Sweden, Netherlands, Italy, Austria, Japan, South Korea, China and some other countries. These countries will provide us with vice chancellors, top faculty, training, examination system and equivalence of degree with their own system for 10-15 years. Each university will be established at an estimated cost of approximately \$ 400 million. Over 4500 scholars will be trained for doctoral degrees to eventually form the faculty of these universities. The universities will have technology parks and technology incubators with enhanced links to the industry of the area. This will be a gigantic step forward.

INNOVATION AND ENTREPRENEURSHIP PROMOTION

A major programme has been launched to promote innovation and entrepreneurship in Pakistan which involves modification of curricula, introduction of courses in innovation and entrepreneurship within university systems, establishment of technology parks and technology incubators and providing access to venture capital and soft loans to new start-up companies.

POLITICAL WILL

Under the dynamic leadership of President Pervaiz Musharraf there has been several thousand per cent increase in the budget for higher education in the last four years. This has set the scene for transforming Pakistan from an agricultural economy to a knowledge economy.