TRANSITIONING TO A KNOWLEDGE ECONOMY:

CHALLENGES FOR DEVELOPING COUNTRIES

Atta-ur-Rahman, FRS

- **Human capital with knowledge and skills**
- **Technology**
- **Innovation/Entrepreneurship Infrastructure and incentives to innovate**

The Triple Helix

- ***Academia ---- Industry ---- Government***

Role of Private Sector (R & D almost missing in developing countries)

Global R&D expenditure US$ 1. 4 trillion, Private companies (63%).

Truth Stranger than Fiction !

- Metamaterials---cloaking devices
- Bullet proof paper: Nanocellulose
- Stem cells
- Anti-Ageing Compounds (Resveratol)
- Aeroplanes flying without internal fuel
- Paralysed moving wheel chairs, and cars driven --- with thought control
- Blind Seeing with the Tongue

Cyborg beetle: a giant flower beetle with a processor and implanted electrodes - a living machine whose flight can be wirelessly controlled

Pakistan---An Exciting Beginning !!

- My appointment as Federal Minister of Science & Technology (2000) and Chairman Higher Education Commission (2002-2008)

- 6,000% Increase in Development Budget of Science Ministry and 3,500% increase in Dev. Budget of Higher Education

- ***HEC an autonomous body reporting to PM***

- ***Challenges: Quality, Access, Relevance***

Challenge: How do we attract our brightest to Education/Research ?

- ***Pakistan has about 100 million out of population of 180 million below age 19 (55% of population) !***

- Both a Challenge and an Opportunity

- It is the brightest among them who must provide the leadership in all fields--- education, S&T, Innovation, Government
- ***HOW ??***

- *Excite young minds* about the wonders of science !
- *Select and train the Brightest in top universities abroad*
- *Attract them back*--- by creating an enabling environment :
- Salaries: 5 Times of Federal Ministers !
- Research Funding: $ 100,000/student
- Access to Literature: Digital Library
- Instrumentation: Open Access
- Critical Mass — create clusters !

- ***Massive Foreign scholarship programs:*** **Nearly 11,000 awarded**

  World's largest Fulbright Scholarship program for the US

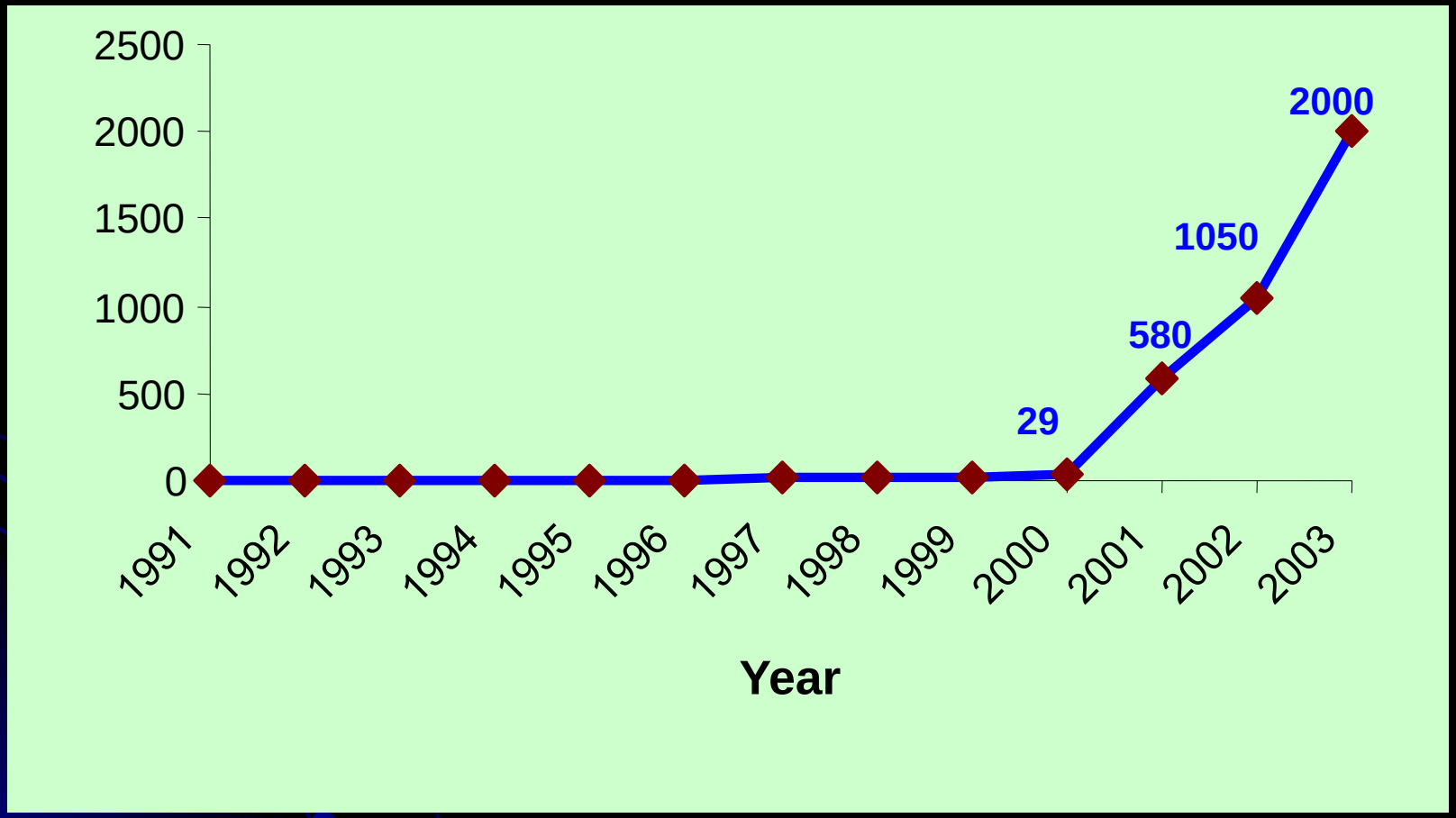
  About US$ 1 Billion being spent on Foreign Scholarships (1500 in IT)

Technology Parks

Business incubators, Offices of Commercialisation, university-industry linkages, STED Program

Information Technology

Spread of Internet Services in Cities & Towns of Pakistan



International Collaborations

- 2000 Live lectures already delivered through Video-conferencing

- TV/internet in Pakistan: MIT Open Courseware, Coursera, EdX, Udacity, AppleiTunesU, Khan Academy

- ***New Technologies are Leveling the Playing Field: Asia to Lead the World!***

Increasing Access

- 1947-2003 : 270,000 university students
  2011 : 960,000 university students

- No. of Public Sector Universities / Degree Awarding Institutes : 59 in 2000 to 137 in 2011
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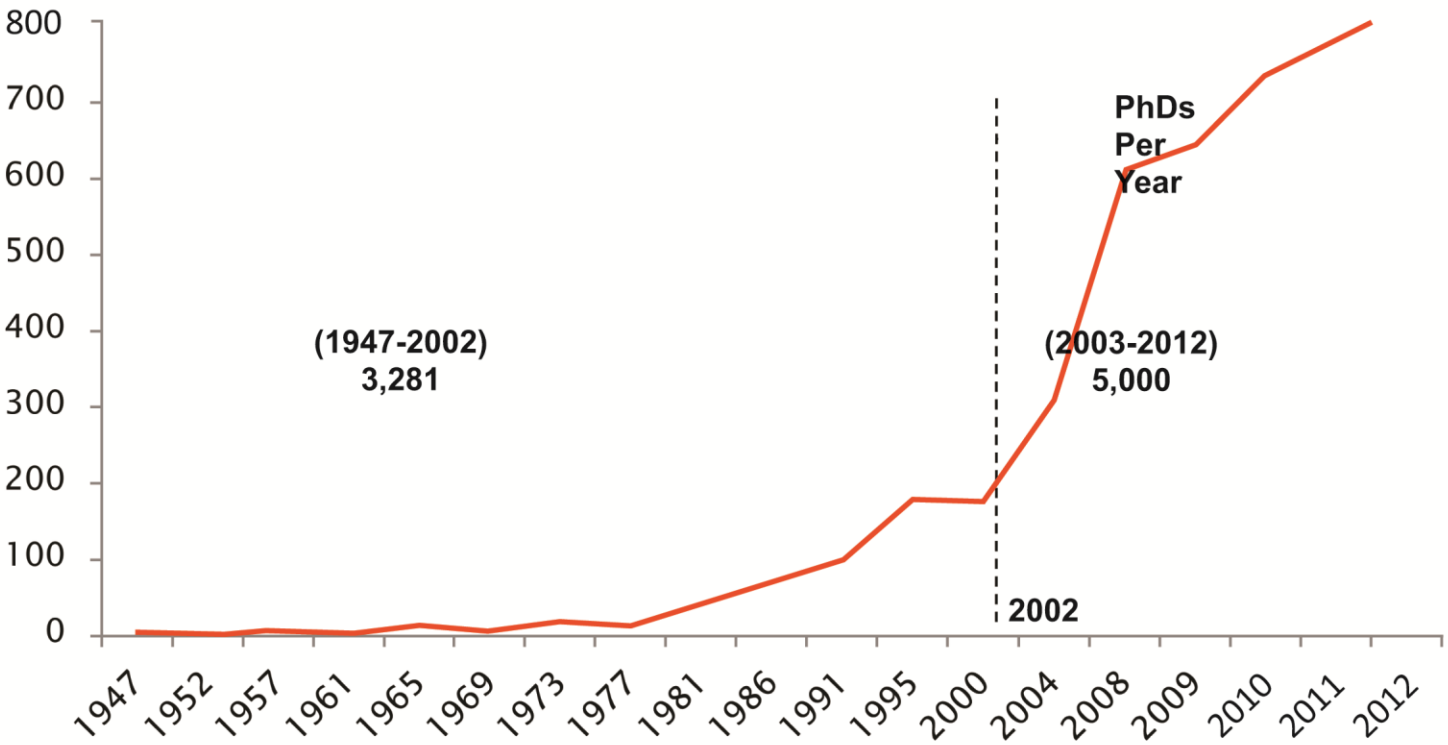
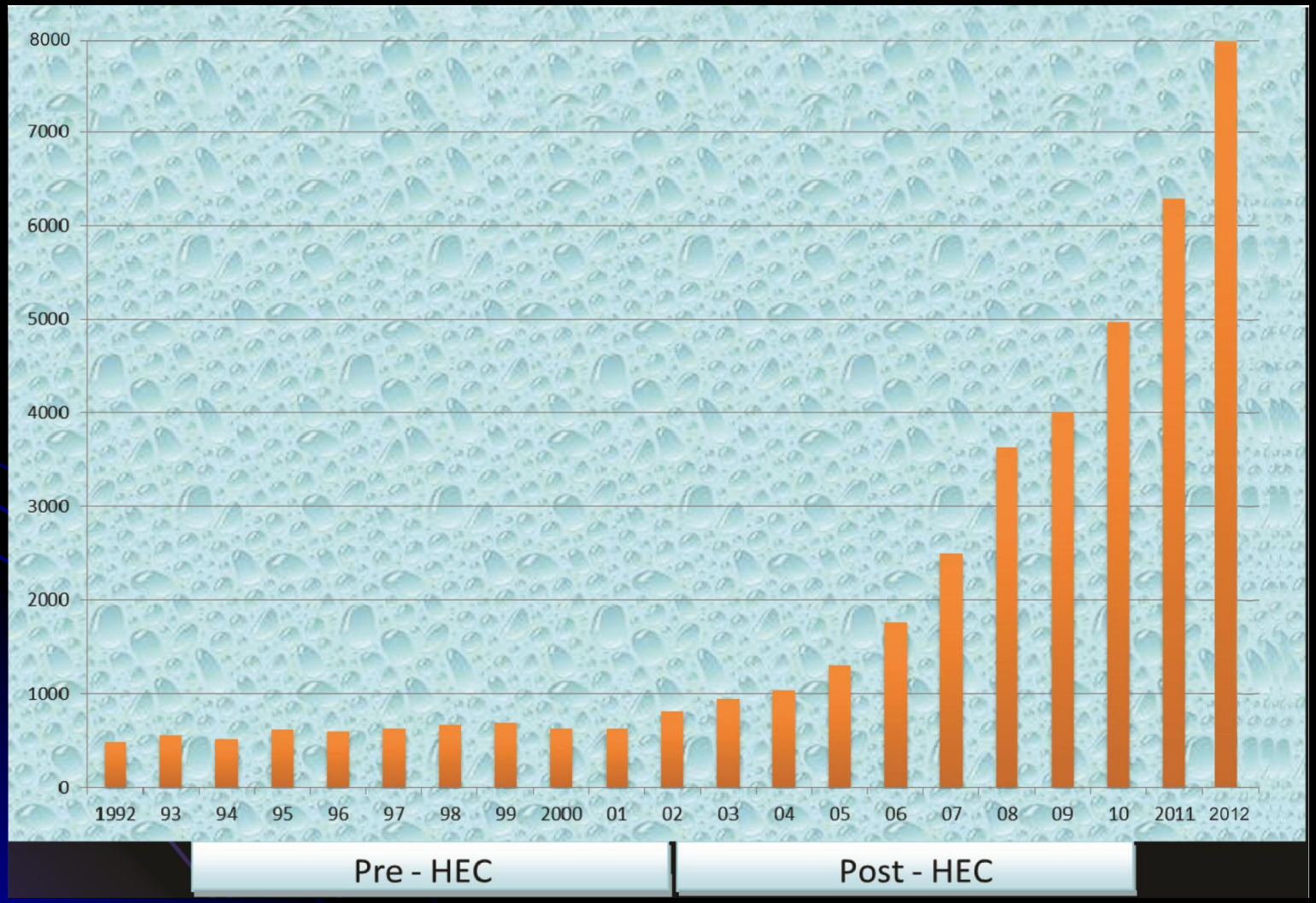
Year-wise PhDs Produced



International Research Publications



International Praise

- **Six Pakistani universities ranked among the top 500 universities of the World**

- **4 Editorials in Nature/ USAID/ World Bank/British Council**

- "A New Golden Age ?" (The Royal Society London) "Pakistan as the best practice model to be followed by other developing countries"

- TWAS Prize for Institution Building

IMPACT !

- IT Exports : 15 Year tax holiday/ Centres of Excellence: $ 30 Mln to $ 1000 Mln
- Mobile Telephony: 0.3 Mln to 110 Mln

Hundreds of thousands of new jobs created due to expansion in mobile services

- Many new companies formed by returning trained manpower: CARE: Contract of $ 250 mln (Rs. 20 Bln)
- Higher Education Transformation
- ***Thanks***