

EIB Forum  
Helsinki 27-28 October 2005

**Prof. R. V. Raja Kumar**

Dean of Academic Affairs,  
Indian Institute of Technology  
Kharagpur, India



Lisbon Strategy – Closing Europe's Innovation Gap



# India – A Science and Technology Power House

**Prof. R. V. Raja Kumar  
and  
Prof. S. K. Dube**

**Indian Institute of Technology,  
Kharagpur – 721302**

**skdube@iitkgp.ernet.in**

**rkumar@ece.iitkgp.ernet.in**

# India Today

- Population = 1.08 Billion
  - GDP (2004) = US\$ 688.7 B ( FB: US \$ 3.1 Tril.).
  - GDP growth rate  $> 7\%$ .
  - 25% of population is below poverty line.
  - Literacy rate = 63%.
  - A knowledge based society.
  - School education and training is very strong.
  - Mental Math capabilities and training is good.
  - English training at school level.
  - Children's education is a top priority for parents.
  - World's 2nd largest S&T manpower.
  - Growth rate of enrol., in higher education  $> 6\%$ .
- A good case for know. based economy.**

# Present Tech. Scenario

- Rapid strides in technology development
- Emergence of newer services
- Globalization of market.  
Challenges and opportunities to society (industry) in many fronts.
- Knowledge based economical growth
- India opened up for foreign direct investments – Telecom, IT, Infrastructure, Mining, Insurance, Pharmaceuticals....
- Supporting policy frame work expl. int. capital  
→ **Tremendous opportunity for growth**

# Growth of S&T Manpower

Category	1991	2004
Graduation and above	3.70	8.8
Diploma	0.85	3.9
Science Post-graduates	0.48	2.2
Engineers	0.52	2.0
PhD	--	> 0.03

In Millions

- S&T manpower = 1.5% of population (parity with US, UK).
- IT manpower = 1.0 Mill.

# S&T Educational Institutions and Enrolment

No. & type of Institutions	Enrolment in Millions
• 275plus Universities and 14,000 collages →	3.41
• 1370 Engg. Inst.s →	0.45
• 1012 MCA Inst.s →	0.054
• 1245 Polytechnics →	0.265
• 445 Pharma. →	0.0245
• 800 Management Inst. →	0.07

**Present growth rate of Engg., intake = 21.9%**

# The IT Success Story

Service	Revenue in 2003-04	Revenue in 2004-05	Exports in 2003-04	Exports in 2004-05
IT services and Software	12.8	16.5	9.2	12.2
ITeS/BPO	3.9	5.7	3.6	5.1

In Billions of US\$

- Three companies in Bil. Dollar club
- GDP share = 3+ (8-10% by 2008)
- Export share = 25%
- Employment in IT and ITeS = 1 M (dir.) 3 M (indirect)  
( Four-fold increase in the last 5 years)
- IT export growth = 35%

# How it has been Made Possible?

- Earlier the education was Govt. responsibility.
- Govt. opened-up Higher education to private investment with accreditation.
- Entrepreneurs jumped in.
- When it was becoming difficult for state education system to match the IT boom in the early 80's  
→ aggressive private inst.s catered to the needs.
- Growth friendly policy from Govt.
- Sensitive and S&T liking society.
- The IT manpower is created.
- Affordable work force.

# Future Growth in IT

- Continuation of the growth (four-fold in last 5 yrs)
  - Expected growth in IT = US\$ 80 B by 2008.  
(NASSCOM & McKinsey)
  - IT export service segment = 0.97 M.
  - By 2012, the ITeS/IT industries could provide direct employment to about 5.1 million people
  - Expected offsh., jobs in the next decade = 6 – 8 M
- India's S&T Manpower can take the load.
- Feasible

# Extension to R&D Services

## Why R&D?

- R & D is being increasingly outsourced.
- R & D is getting oriented towards product/service development.
- Reduction in the Govt. contribution and rise in share of Pvt. Sector.
- Increased reliance on educational institutions.

## India's Advantage:

- High quality Inst.s like IITs → tremendous strength (Shanghai report placed IITs as world no.3)
- Large pool of S&T Manpower.
- A no. of research organizations like CSIR.

# Potential Areas for R&D Services

**R&D Services:** Research, Design, Engineering, IP  
Generation and Solutions.

## Areas:

IT, Pharmaceuticals / Biotechnology, Embedded systems, Digital electronics, VLSI design, Circuit layout/design, Verification and logic design, Information Security solutions, High Performance Computing, Wireless and Mobile applications, Nanotechnology and Digital Signal Processing.

# Status of Engineering Education in India

- Phenomenal growth rate (21.9%)
- The seven IITs and IISC,
- Seventeen NITs / RECs and 5 IIITs
- A few specialized institutions like Indian School Of Mines run by MHRD
- About 1346 Engineering colleges (state run and private)
- A large no., of disciplines
- IT literacy and training
- Significant differences in ways of financial support, functioning, culture and quality.

# Challenges Faced by Tech Education Today

- Catering to increasing human resource needs
- Rapid growth of interdisciplinary areas
- Quality human resource generation for Technical education itself
- Globalization of Technical education
- Coping up with the HR market dynamics
- Controlling the weaknesses in the system
- Other issues: promotion of entrepreneurship, providing opportunity for education in a chosen field and to prosper.



**IIT**  
Kharagpur

# Concluding Remarks

- India has the numbers and potential to absorb the IT demand.
- Consistency in growth and capacity proven industry
- There is great scope for R&D outsourcing
- Tremendous scope for extension to other areas.
- Scope for increasing IIT like Institutions.
- Enhanced level of quality control is needed for the education sector.
- A great scope for entrepreneurship and opportunity for venture capitalists.
- Excellent opportunity for others as well.

***Thank you***

# Other Potential Countries

**China, Philippines, Ireland,  
Australia, Canada,.....**

## China

- **China has numbers**
- **Low cost**
- **Govt. support**
- **Excellent PC & Tele-density**
- **Lack of quality record**
- **Non-English speaking**
- **Recent entrant**

## Philippines

- **Shortage of numbers**
- **Cost -lower than US, UK**
- **Improving infrastructure**
- **Good IT skills**
- **Lack of quality record**
- **English speaking**
- **Political instability**
- **Former American colony**