

***Kogod School of Business  
American University  
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**Collaboration and Competition among  
Global High Technology Clusters:  
Focus India**

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# High technology Clusters

Geographic concentrations of interconnected companies, specialized suppliers, service providers and associated institutions in the High-Tech industry: Examples: Silicon Valley in California; Research Triangle Park in North Carolina

# Hi-Tech Industries

- Information Technology
- Biotechnology
- Pharmaceuticals
- Electronics
- Telecommunications
- Entertainment
- IT Enabled Services
- Technological convergence between sectors?

# Knowledge: Integral Part of High Technology Clusters

- High–technology industries are characterized as knowledge intensive and dynamic industries: Much higher ratio of human to physical capital.
- The ability of a firm to create new knowledge and exploit it i.e. its ability to learn and innovate, is a key determinant for its long term success.
- Thus, how well a firm is connected to internal as well as external sources of learning will essentially play a defining role on growth.
- Network relationships consequently play a key role in knowledge based industry.

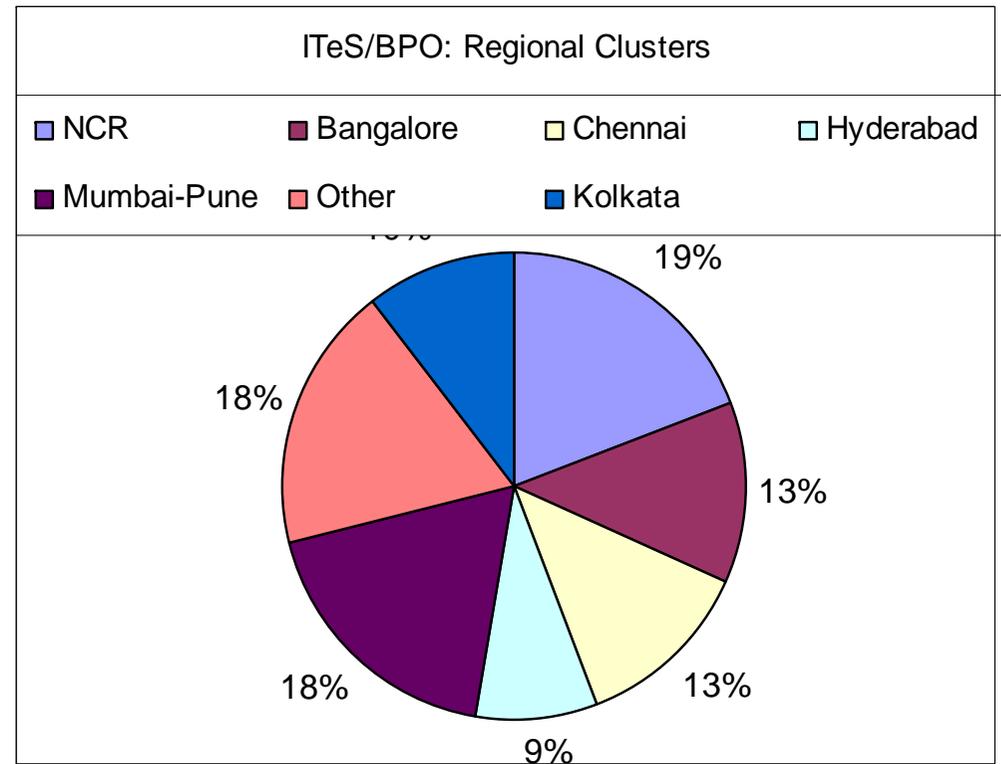
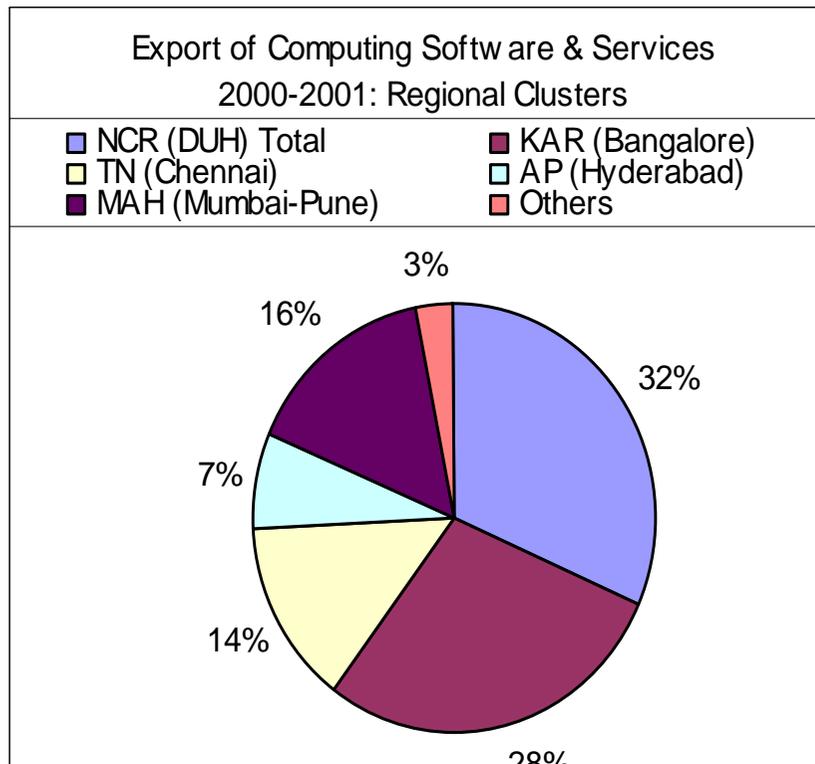
# Knowledge Communication and Knowledge Combination

- Communication is important for the transfer of knowledge within and between organization.
- More efficient communication will lead to greater volume of knowledge transferred and greater will be the potential for organizations to learn.
- Knowledge creation on the other hand is driven by knowledge combination. The creation of new associations between knowledge items will result in new discoveries and inventions such as development of new product ideas or concepts.

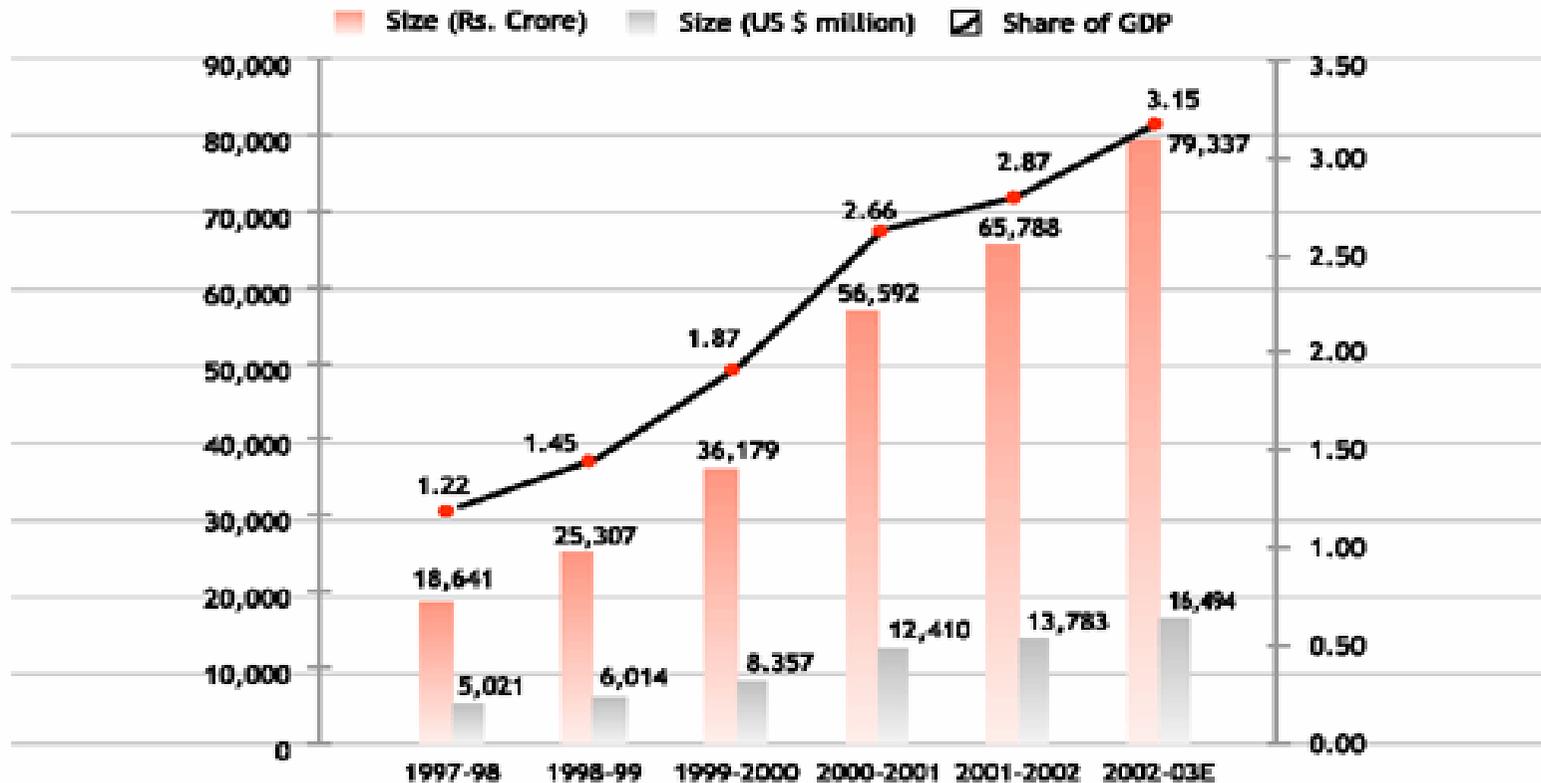
# Role of a Cluster

- A cluster plays a crucial role in knowledge creation and communication.
- A cluster brings together knowledge and technology, which are usually dispersed, under a defined geographic/economic region which allows quick and easy access to different sources of knowledge and smooth flow of information.
- Being in a cluster allows companies to be more competitive as it is easier to find skilled labor, established infrastructure, access suppliers efficiently and operate productively
- For example, Silicon Valley is well defined in terms of geographic region, and has various companies from software and hardware to sales and marketing for the hi tech industry. The Research Technology Park in North Carolina is another cluster focused on pharmaceuticals and biotechnology. In India: NCR, Bangalore, Madras, Mumbai and Hyderabad.
- Biotechnology: The new wave? Bio-valleys emerging alongside existing hi-tech clusters in India.

# Clustering of Indian IT Industry



## Indian IT Market : 1997 - 2002

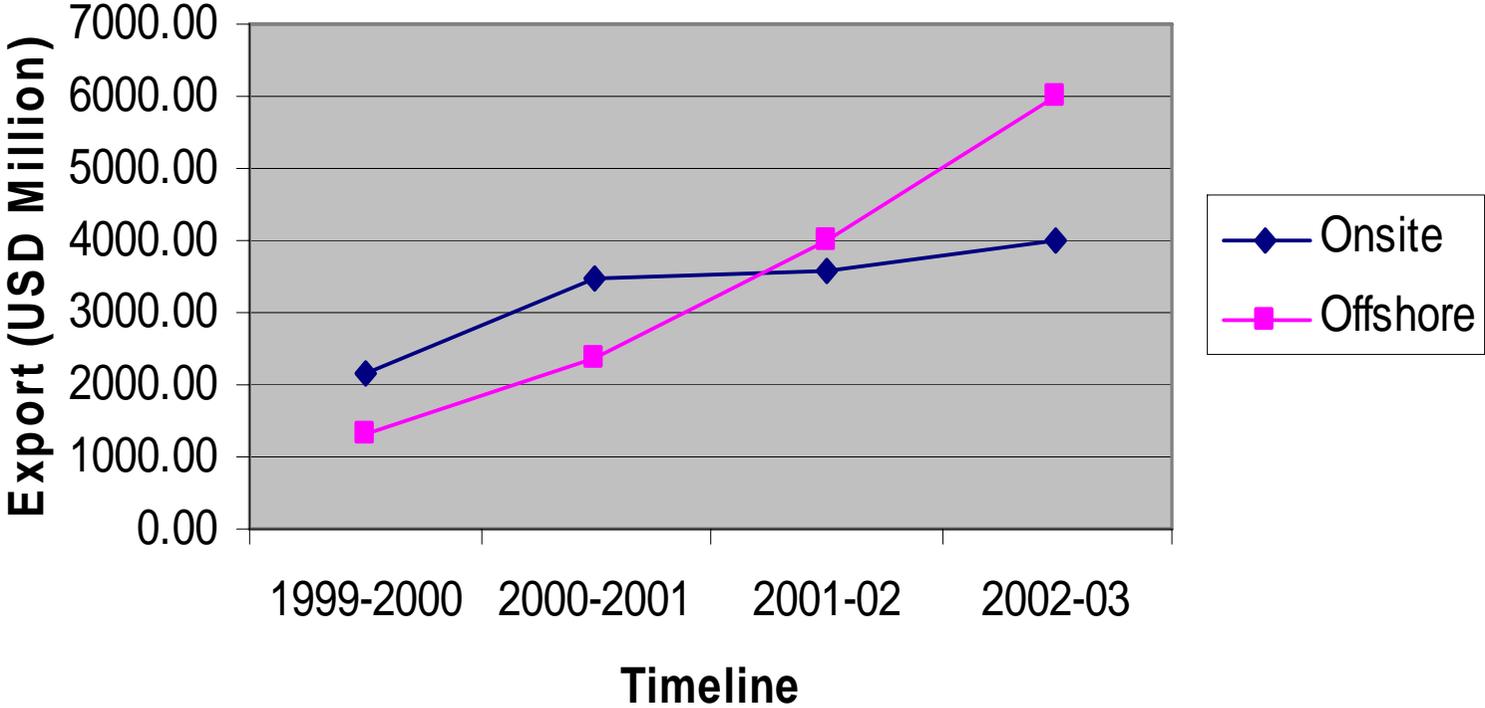


Source: NASSCOM

Note: IT includes hardware, peripherals, networking, domestic and exports market for software & services and IT Enabled Services

**NASSCOM**  
www.nasscom.org

# Onsite Vs Offshore Trend



# IT Software v/s ITES Exports

Year	IT Software & Service		ITES/BPO		ITES/IT Exports
	US \$ M	Grate	US \$ M	Grate	
1999-00	3397		565.00		14.3%
2000-01	5287	56%	930.00	65%	15.0%
2001-02	6172	17%	1475.00	59%	19.3%
2002-03 <sup>E</sup>	7475	21%	2400.00	63%	24.3%

# Indian ITES Clusters

- **Phase I:** Major TNCs like GE, American Express, and Swiss Air who set up captive operations in leading metros such as Delhi and Mumbai.
  - **Phase II:** Several entrepreneurs (incl. former TNC employees) set up their own ITES ventures in and around Delhi (NCR) and Mumbai.
  - **Phase III:** New locations emerging such as Hyderabad, Pune, Bangalore, Chennai, and more recently, Kochi
- **NASSCOM Rankings** based on key infrastructure, human resources, entrepreneurship, policy environment and perception:
    1. Hyderabad
    2. Kochi
    3. Chennai
    4. Kolkata
    5. Ahmedabad
    6. Bangalore
    7. Mumbai
    8. NCR
    9. Pune

# External Linkages of Indian IT Industry

<i>US \$ M</i>	IT Industry	Grate	Domestic	Grate	IT Exports	Grate	X/IT
<b>1997-98</b>	5021		3262.00		1759		35.0%
<b>1998-99</b>	6014	19.8%	3414.00	4.7%	2600	47.8%	43.2%
<b>1999-00</b>	8357	39.0%	4395.00	28.7%	3962	52.4%	47.4%
<b>2000-01</b>	12410	48.5%	6193.00	40.9%	6217	56.9%	50.1%
<b>2001-02</b>	13783	11.1%	6136.00	-0.9%	7647	23.0%	55.5%
<b>2002-03E</b>	16494	19.7%	6619.00	7.9%	9875	29.1%	59.9%
<b>Average</b>		27.6%		16.3%		41.8%	

# Direction of Indian IT Vs Merchandise Exports

IT Services Spending: Regional Shares, 2002-2003					
US \$ B	IT Services	India's	India's	Share in	Share in Indian
	Spending	Exports	Mkt. Share (%)	Indian IT Exports	Merchandise Exports
North America	171.1	6.69	3.92	67.7%	20.8%
Western Europe	109.6	2.10	1.92	21.3%	21.8%
ROW	17.5	0.58	3.33	5.9%	31.7%
Asia Pacific	50.9	0.50	2.49	5.1%	25.7%
Total	349.1	9.88	2.82		

# Structure of Indian IT Industry

## Structure of Indian Software Exports Industry

Annual turnover	No. of companies	
	2000-01	2001-02
Above Rs. 1,000 crore	5	5
Rs. 500 crore - Rs. 1,000 crore	7	5
Rs. 250 crore - Rs. 500 crore	14	15
Rs. 100 crore - Rs. 250 crore	28	27
Rs. 50 crore - Rs. 100 crore	25	55
Rs. 10 crore - Rs. 50 crore	193	220
Below Rs. 10 crore	544	2,483

Note: In 2001-02, companies under Rs. 10 crore revenues include non-NASSCOM member companies

Source: NASSCOM

**NASSCOM**  
www.nasscom.org

# NASSCOM-McKINSEY Study 2002

<b>Indian IT sector Forecast for Year 2008</b>						
	<b>2002-03E</b>	<b>US \$ Bill.</b>		<b>% of Total IT</b>		
		<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>2002-03E</b>
IT service Exports	7.48	28	30	57%	56%	76%
ITES Exports	2.40	21	24	43%	44%	24%
<b>Total IT Exports</b>	<b>9.88</b>	<b>49</b>	<b>54</b>	<b>70%</b>	<b>68%</b>	<b>60%</b>
<b>Domestic IT</b>	<b>6.62</b>	<b>21</b>	<b>26</b>	<b>30%</b>	<b>33%</b>	<b>40%</b>
<b>Total</b>	<b>16.49</b>	<b>70</b>	<b>80</b>	<b>(excl. \$ 10 B e-commerce)</b>		

- 7% of GDP (8% incl. e-commerce) & 30% of forex inflows in 2008
- Direct employment of 4 million by 2008
- CAGR assumptions:
  - Overall 27-30% (27.5% average annual growth 1998-99 to 2002-03)
  - Domestic 20-25% (16.5% average annual growth 1998-99 to 2002-03)
  - Exports 30-33% (42 % average annual growth 1998-99 to 2002-03)

# Collaboration between International Hi-Tech Clusters & India

- Numerous companies around the world have chosen India as the preferred destination for outsourcing their IT needs to remain globally competitive.
- Collaborations range from providing IT services such as call centers, data warehousing, Business Process outsourcing to designing and maintaining software and other operations.
- Many multinational companies – such as those based in the large Silicon Valley and New York clusters -- have established offices in Indian IT clusters to manage their IT operations.
- Companies such as Citibank to organizations like the World Bank have established their operations in IT clusters to take advantage of the benefits it offers.

# India :A Center for High Technology

## Integrated Chip Design

Texas Instruments  
Siemens  
Synopsis  
Philips  
Analog Devices  
National Semiconductors  
Cadens

## Communication Software

Lucent Technologies

Nortel

Siemens

Motorola

Cisco Systems

Ericcson

Sony

Hughes

## System Software

Microsoft  
Oracle  
Novell  
Sun Microsystems  
Digital/Compaq  
Hewlett Packard  
Fujitsu  
Sapient

# TNCs operating from India in ITES

- ❖ Airline Financial Support Services in (India) Pvt. Ltd
- ❖ American Express
- ❖ Bellman Data
- ❖ Boston Education & Software Technologies Pvt. Ltd.
- ❖ B.T. TechNet Ltd.
- ❖ BT Worldwide Ltd.
- ❖ Citicorp Information Technology Industries Ltd.
- ❖ Citicorp Securities & Investment Ltd.
- ❖ Credence Transcription Pvt. Ltd.
- ❖ G.E. Capital India
- ❖ Inde-Dutch Systems (I) Ltd
- ❖ Pricewaterhouse Coopers
- ❖ SGS InfoTech Pvt. Ltd.
- ❖ HSBC Electronics Data Processing
- ❖ DELL Computers

# Collaboration v/s Competition

- Collaboration
  - Cost but not technology sensitive
    - JV/outsourcing
  - Between TNCs & Companies with relatively cheap highly skilled labor.
  - Between clusters to top up deficits in specific areas
  - Global linkages: Indian IT industry integrated more with international economy than domestic.
- Competition
  - Technology sensitive
    - Equity ownership
  - Between Hi-tech clusters in different countries.
  - Between Hi-Tech clusters within the country.
  - Global Linkages: Between TNCs with web clusters of subsidiaries & outsourced services

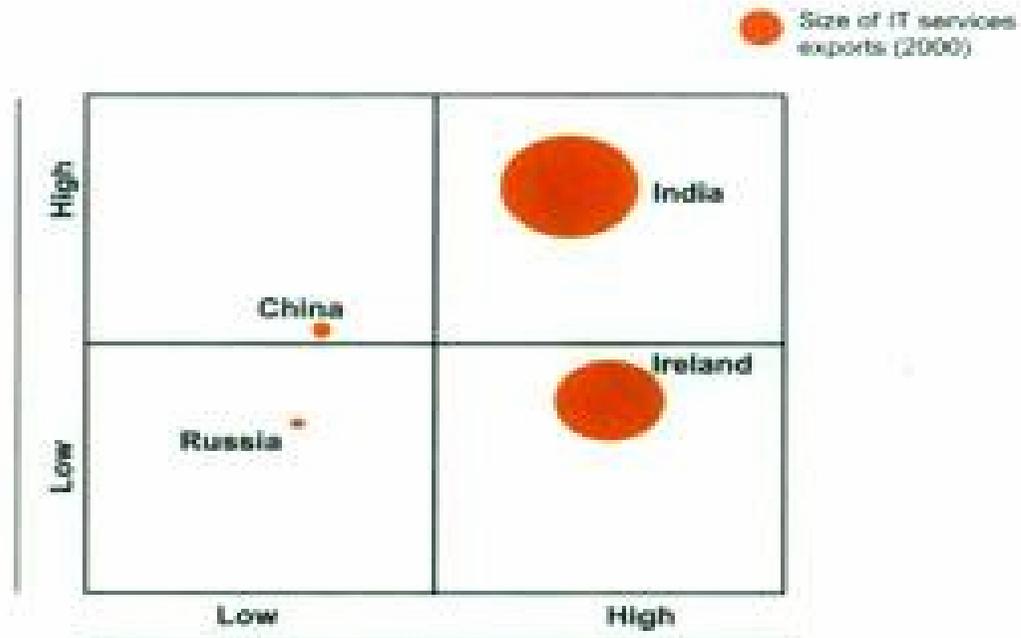
# Competition & Collaboration Among International IT Clusters

- The IT market in India has been growing at a robust pace and this has attracted other countries with similar resources to jump into the fray. Countries such as China, Ireland, Philippines and Mexico have established a credible space on the IT map.
- China with nearly 430 million phone users and much larger PC penetration holds great potential in this sector. The Chinese software industry recorded a healthy 40% growth in the year 2002.
- Many TNCs are looking at China as a potential location to move their back office operations. With cost structure similar to that of India, many believe China will be a stiff competitor in the IT industry.
- Gartner's projections, while showing China catching up with India in software service revenues (excluding ITES) by 2006, however also indicate that 40% of Indian revenues would be from China.
- India's relative advantage mainly english, and large number of graduates and highly skilled IT professionals. In the bio-tech sector, India's great bio-diversity is an added advantage.

## Current & Future Strength of Indian IT Industry in Global Perspective

### Future strengths

- Expected size of IT services exports
- Sustainability of cost advantage
- Depth of talent pool
- Likely quality of service delivery
- Expected conduciveness of regulatory environment

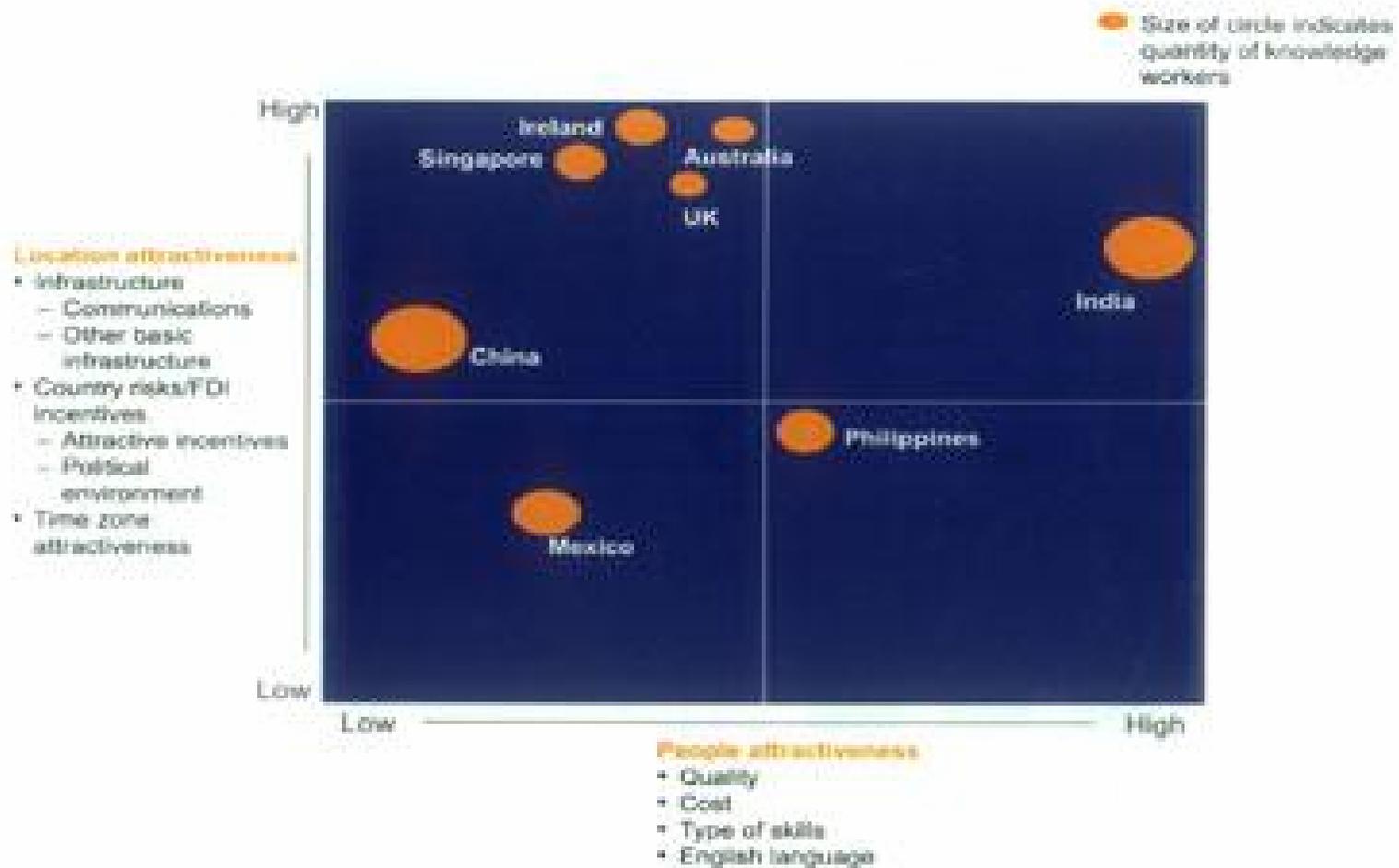


### Current strengths

- Current industry size
- Cost structure for service delivery
- Quality of service delivery
- Regulatory environment
- Culture for services

Source: McKinsey analysis

# Comparative Locational & Manpower Attractiveness of Indian IT Industry in Global Perspective



Source: McKinsey analysis