सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N · S · D · C
National
Skill Development
Corporation
Transforming the skill landscape

Human Resource and Skill Requirements in the
IT and ITeS Sector

(2013-17, 2017-22)

KPMG

cutting through complexity

This report is prepared by KPMG Advisory Services Pvt Ltd (KASPL).

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Disclaimer

Executive Summary

IT and ITeS is contributing around 8% of the total GDP and provides direct employment to around 3 million people

Contribution of IT & ITeS to India's GDP (FY13)
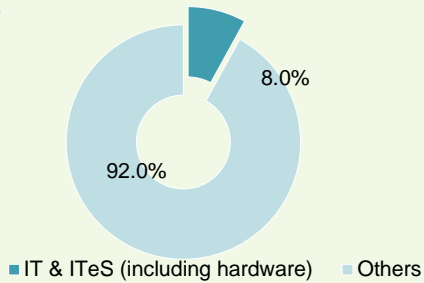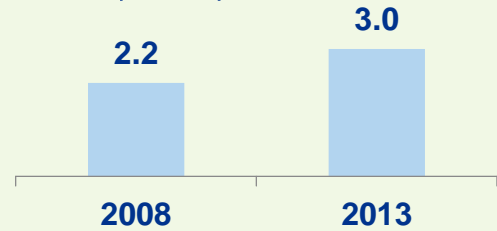
8.0%

92.0%

■ IT & ITeS (including hardware) ■ Others

Direct employment generated by IT & ITeS (million)

2.2 — 2008

3.0 — 2013

- The Indian IT & ITeS sector is pivotal for the Indian economy
- The sector's GDP contribution has increased from 1.2 percent in 1998 to 6.4 percent in 2008 to ~8.0 percent in 2013 driven by significant exports to western countries
- The sector has provided new job opportunities and at present employs about 3 million directly and 9.5 million indirectly
- The Cabinet in August 2014 has approved the ambitious 'Digital India' programme, which aims to connect all gram panchayats by broadband Internet, promote e-governance and transform India into a connected knowledge economy.

Key Drivers

- Significant talent pool
- High ranking on the English proficiency index

- National e-governance plan
- National Mission on Education through ICT
- Automation of the Public Distribution System
- National Knowledge Network
- Digital India programme

- Indian firms are expanding globally
- Business processes are maturing
- Increasing customer focus driving ITeS services

- Focus on India as a primary market
- India-specific R&D
- Low-cost, customized products for the Indian market

- Managed services
- BOOT model
- Outcome-based projects
- Mobility, cloud and social networking technologies

Key drivers for IT & ITeS adoption: Talent support, Aspiring Indian enterprises, New business models, Huge population base, Aggressive focus by service providers, Government investments

Increasing input costs in Tier 1 cities are pushing companies to Tier 2 and 3 cities

- The Indian IT & ITeS sector primarily operates through six major states, including Karnataka, Andhra Pradesh, Maharashtra, Tamil Nadu, Haryana and Uttar Pradesh — major centers of top IT & ITeS firms such as TCS, Infosys, HCL, Tech Mahindra, Cognizant and Capgemini are based in these states. Also, a majority of these centers are based in tier 1 cities of these states, such as Bengaluru, Chennai, Hyderabad, Gurgaon and Noida

- As infrastructure facilities in tier 1 cities saturate and input costs increase, IT & ITeS companies are shifting their focus towards tier 2 and 3 cities. Some of these cities include Ahmedabad, Jaipur, Nagpur, Bhubaneshwar, Mangalore, Guwahati and Chandigarh

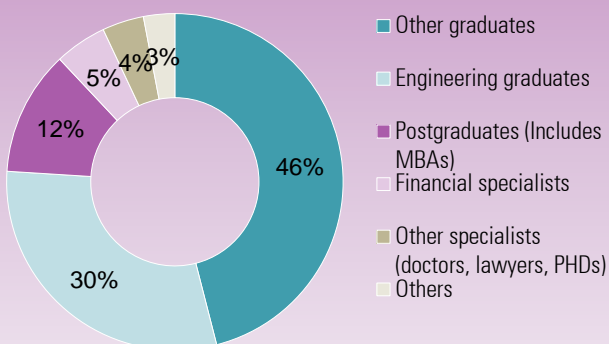- To make the best use of this shift — by cashing in on the cost benefit of tier 2 and 3 regions — enterprises and state bodies should undertake the following initiatives:
  - Increase awareness on the sector through educational institutions at all levels to ensure skilled manpower for the sector
  - Develop an IT ecosystem for long-term sustainability of enterprises
  - Leverage IT & ITeS special economic zones (SEZ) to scale up businesses and receive tax benefits

Geographic mapping of India IT & ITeS sector			
IT Services	**ITeS**	**ER&D**	**SPD**
• Has a strong presence in South and West India, primarily at tier I locations including Bangalore, Mumbai etc.	• North India with Gurgaon has the strongest hold in ITeS domain • Also, has a significant presence in tier 2 cities across India	• Bangalore and Hyderabad has a strong hold in offering these services	• Along with South and West India, East India, primarily Kolkata has a strong presence in this domain • Also, Noida has a significant presence

IT-BPO skill base, 2013E
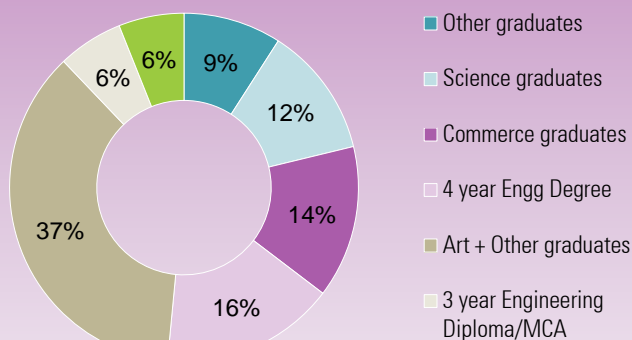
- Other graduates — 46%
- Engineering graduates — 30%
- Postgraduates (Includes MBAs) — 12%
- Financial specialists — 5%
- Other specialists (doctors, lawyers, PHDs) — 4%
- Others — 3%

Talent output, 2013E

- Other graduates — 9%
- Science graduates — 12%
- Commerce graduates — 14%
- 4 year Engg Degree — 16%
- Art + Other graduates — 37%
- 3 year Engineering Diploma/MCA — 6%
- 6%

Key takeaways

- The sector has a variety of skill sets to offer to a wide array of services across verticals
- About one-fourth of the available talent pool can be directly employed in the sector, which includes engineering graduates and MCA graduates

Incremental Human Resource Requirement (2013 – 22)
The sector is expected to provide employment to over 5 million people

Employment in the IT & ITeS sector

- The Indian IT & ITeS industry employs about 3 million directly and 9 million indirectly
- A majority of employment is generated through the exports business
- Exports contribute about 78 percent of the total employment in the sector
- Employment growth was high during FY02–09 period, however, it started settling down with the increasing maturity of the sector and the evolution of non-linear business models
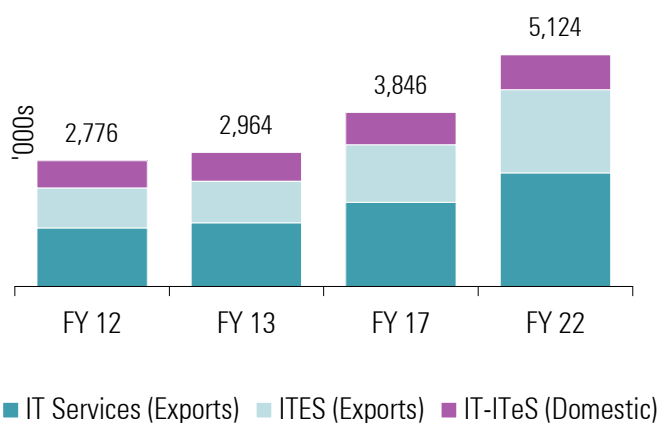- The sector is expected to employ about 5.1 million professionals directly in FY22 and exports are likely to dominate

IT & ITeS industry employment forecast
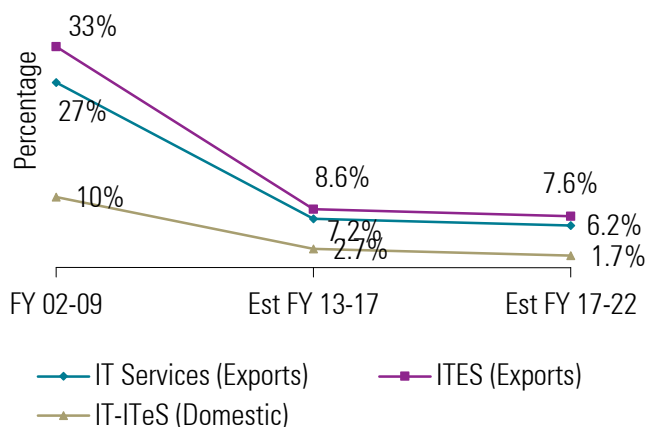
Legend:
- IT Services (Exports)
- ITES (Exports)
- IT-ITeS (Domestic)

IT & ITeS industry employment growth

Legend:
- IT Services (Exports)
- ITES (Exports)
- IT-ITeS (Domestic)

Top 20 job roles by sub-sector					
Job roles/ occupation	Sub-Sector	Job roles/ occupation	Sub-Sector	Job roles/ occupation	Sub-Sector
Application development	ITS	Analytics	ITeS	Legal services	ITeS
Application deployment	ITS	Customer relationship management	ITeS	Supply chain management	ITeS
Data scientists	ITS	Finance and Accounting	ITeS	Engineering analysis	ER&D
Infrastructure management services (IMS)	ITS	Health Services	ITeS	Product engineering design	ER&D
Information security	ITS	Knowledge services — Research	ITeS	Product development and delivery	SPD
Project/ program management	SPD	Sales and marketing/	SPD	Transition	SPD
Product Support	SPD	Testing and quality assurance	SPD		

Intake of students for PG courses forms a minuscule % of total intakes in engineering and technology institutions

Intake of Engineering & Technology Institutions (In Lakhs)

Year	UG	PG	Diploma
2006-07	6.60	0.23	6.03
2007-08	7.01	0.23	6.62
2008-09	7.54	0.23	7.34
2009-10	10.93	0.25	7.72
2010-11	12.19	0.30	8.13
2011-12	13.86	0.33	9.08
2012-13	15.66	0.51	10.30
2013-14	16.35	0.63	11.35
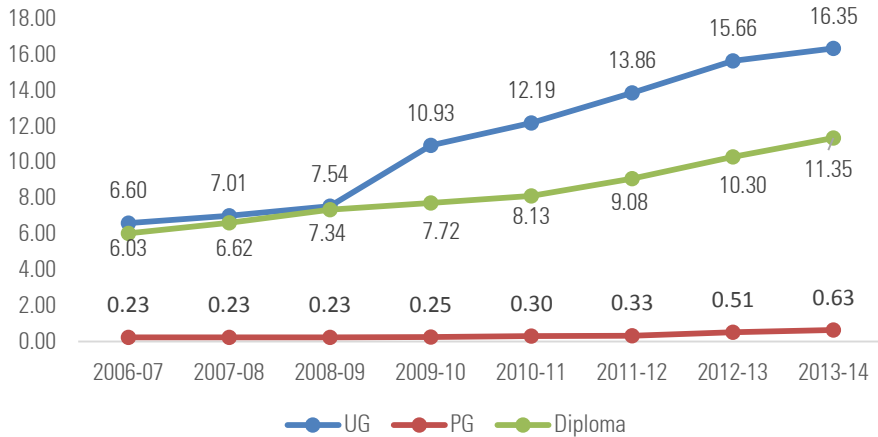
- Intake of students for PG courses forms a minuscule percentage of total number of intakes

- CAGR of intake over the period 2006 - 2014 for UG courses, PG courses and Diploma courses is 13.84%, 15.52%, and 9.45% respectively.

- CAGR in number of institutes offering UG courses, PG courses and Diploma courses over the period 2006 – 2014 is 12.2%, 11.76% and 8.06%.

Less than 10% of Institutes constitute the top of quality pyramid in engineering education offering cutting edge education

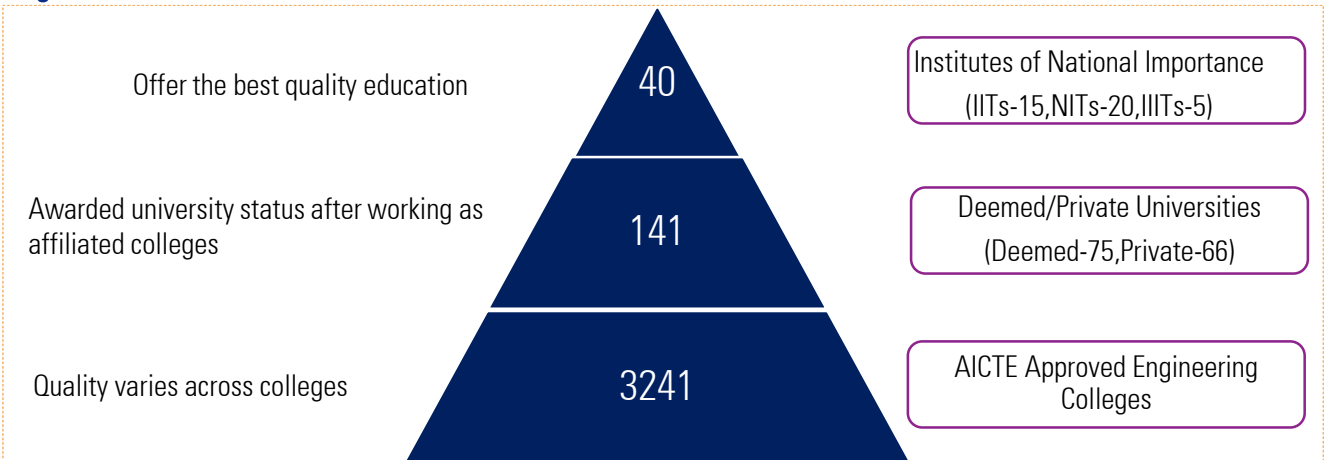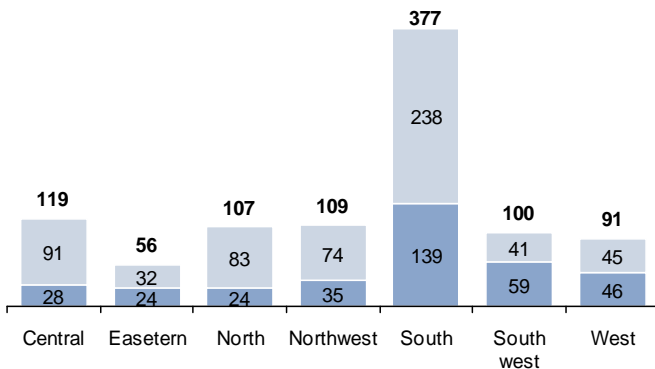|		
Offer the best quality education	**40**	Institutes of National Importance (IITs-15,NITs-20,IIITs-5)
Awarded university status after working as affiliated colleges	**141**	Deemed/Private Universities (Deemed-75,Private-66)
Quality varies across colleges	**3241**	AICTE Approved Engineering Colleges

Incremental addition of engineering seats

Region	Incremental addition between 2005-06 & 2009-10	2005-06	Total
Central	91	28	119
Eastern	32	24	56
North	83	24	107
Northwest	74	35	109
South	238	139	377
South west	41	59	100
West	45	46	91

Incremental addition between 2005-06 & 2009-10 ■ 2005-06

- Southern states have witnessed largest growth in intake capacities between 2005-06 and 2009-10.

- West, South west and eastern regions have witnessed low growth in this period.

- North eastern states and Bihar have lowest engineering seat density per million population indicating potential for private players in these regions provided there is demand in this region.

- Concentration of quality Institutes is uneven with a great demand for such Institutes in Central India.

Recommendation	Implications
Better industry academia partnerships	▪ Industry should collaborate with colleges to set up research labs in the college campuses. ▪ Summer internships should be made an integral part of the curriculum. ▪ Colleges should reach out to more and more industry experts to have them as guest faculties ▪ Industry needs to encourage continuing education programs for their employees in collaboration with leading universities and colleges
Capacity building in regions with low density of training infrastructure	▪ Government should set up technical institutes in regions with low density of engineering colleges ▪ State governments with low density of engineering colleges should provide incentives to private players to set up technical institutes in their states
Focus on improving the quality of faculty and also on increasing the faculty strength	▪ Increased focus on up-scaling programs would help improve faculty quality ▪ Colleges and universities should focus on improving the research infrastructure. Well funded Ph.D programs with opportunities for international exposure should be rolled out to attract students who currently look to pursue Ph.D outside the country ▪ More institutes which provide trainer certification programs should be set up via PPP model
Focus on soft skill training .	▪ Colleges and training institutes should focus on developing good communication skills amongst the students pursuing education in IT and ITeS related fields.
Encourage institutes to offer cross-sectoral degrees	▪ Institutes should offer IT modules across other streams of engineering ▪ IT modules should be embedded in the curriculum of other specializations.
Rationalization of targets allotted to current partners	▪ Make provision for additional capacity because existing partners might not be able to meet the targets allotted to them ▪ Create additional capacities in select identified courses/geographies.
Reforming the regulatory framework	▪ An independent regulatory authority should be set up by the government. This agency would be responsible for setting the criteria for entry, granting permissions for entry to higher education institutes, according degree granting power, monitoring standards and settling disputes, licensing accreditation agencies. ▪ Government should increase the financing for higher education ▪ Government should float education bonds and elite institutes must be encouraged to raise funds by themselves
Making certification by SSC more acceptable	▪ Map up-scaling training to SSC certification ▪ There should be a mandate given to the industry to hire only trained or certified manpower

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Abbreviations

CAGR	Compounded Average Growth Rate
ER&D	Engineering Design and Product Development
IT	Information Technology
ITeS	Information Technology Enabled Services
SMAC	Social media, Mobility, Analytics and Cloud computing
SPD	Software Product Development
BPM	Business Process Management
STPs	Software Technology Parks
ITIR	IT Investment Regions
EOUs	Export Oriented Units
ICT	Information and Communications Technology
AVGC	Animation, Visual Effects, Gaming and Comics
MSME	Micro Small and Medium Enterprises
SEZ	Special Economic Zone
BOT	Build Operate Transfer
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
PPP	Public Private Partnerships
UI	User Interface

Context and approach

Brief background	NSDC had conducted sector-wise skill gap studies for 19 high priority sectors in 2008–09 . ▪ KPMG has been engaged as a consultant to help evaluate the skill gap across 25 sectors and develop actionable recommendations for its stakeholders. ▪ Mandate includes sector and sub-sector level analysis, demand-supply projection, estimation of incremental man-power requirement between 2013-2017 and 2017-2022, identification of key-employment clusters, and SWOT analysis of each sector ▪ Study also aims to take qualitative insights from stakeholders on enablers and challenges for each sector, way forward in terms of specific policy level actionable recommendations,
Inclusions over the previous study	▪ Study led by industry – Sector Skill Councils and a panel of professionals from different sub-sectors were consulted for their inputs on industry trends, key takeaways in terms of skill requirement, qualitative insights to understand specific interventions required for each sector and to validate the quantitative results and recommendations ▪ 6 sectors were added to the list of NSDC priority sectors for studying the skill gaps Updated study also includes ▪ Identification of top 20 job-roles in each sector, case studies around good training practices, sub-sector level indicators and growth factors ▪ Study also includes understanding of existing training infrastructure, work-force characteristics and employment clusters, ▪ Macro economic factors, central and state governments policies and their envisaged impact ▪ Synchronisation of the sector wise demand from the district level skill gap studies ▪ Recommendations for key stakeholders - Industry, NSDC, Training organizations and Government ▪ Environment scans every year till 2015-16 including SWOT analysis for the sector

Industry classification

IT and ITeS sector has been covered under the NIC classification undertaken by Government of India

Sector and subsectors as per NIC classification

620			Computer programming, consultancy and related activities
	6201		**Computer programming activities**
			This class excludes:
			- publishing packaged software
			- planning and designing computer systems that integrate computer hardware, software and communication technologies, even though providing software might be an integral part
		62011	Writing , modifying, testing of computer program to meet the needs of a particular client excluding web-page designing
		62012	Web-page designing
		62013	Providing software support and maintenance to the clients
	6202		**Computer consultancy and computer facilities management activities**
			This class includes installation of computer system, providing training and support to the users of the system and providing hardware support including planning and designing of computer systems that integrate communication technologies, computer hardware and software
		62020	Computer consultancy and computer facilities management activities
	6209		**Other information technology and computer service activities**
			This class excludes:
			- computer programming
		62091	Software installation
		62092	Computer disaster recovery
		62099	Other information technology and computer service activities n.e.c
582			**Software publishing**
	5820		**Software publishing**
		58201	Publishing of operating systems and system software
		58202	Publishing of operating business and other applications
		58203	Publishing of computer games for all platforms

Sources: National Industrial Classification 2008, Ministry of Statistics and Program Implementation of Government of India
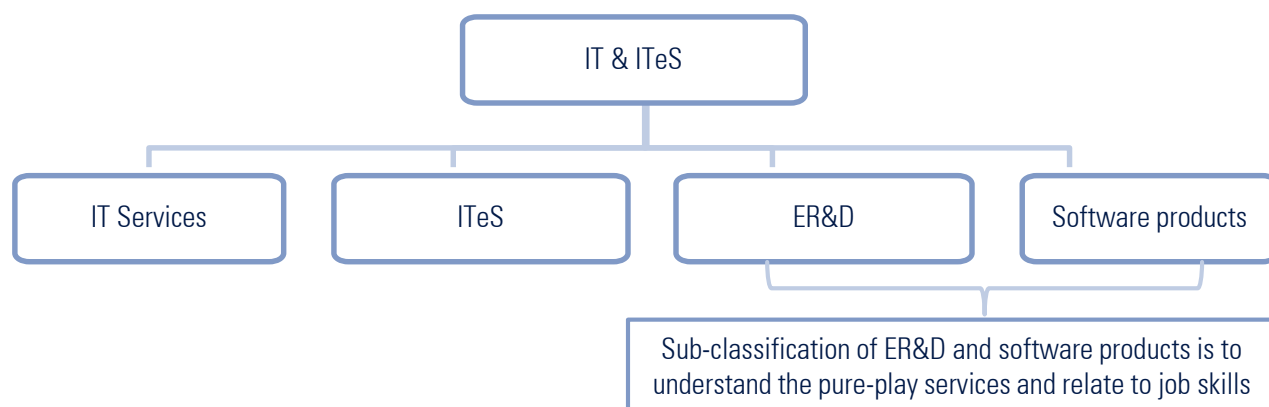
IT and ITeS sector has been covered under the NIC classification undertaken by Government of India

631			Data processing, hosting and related activities; web portals
	6311		**Data processing, hosting and related activities**
		63111	Data processing activities including report writing
		63112	Web hosting activities
		63113	Providing general time-share mainframe facilities to clients
		63114	Providing data entry services
		63119	Other data processing, hosting and related activities n.e.c
	6312		**Web portals**
		63121	Operation of web sites that use a search engine to generate and maintain extensive databases of internet addresses and content in an easily searchable format
		63122	Operation of other websites that act as portals to the Internet, such as media sites providing periodically updated content

Major sub-sectors and sub-segments

- The Indian IT-ITeS sector is primarily classified into four broad categories — IT Services, ITeS, engineering design and products development (ER&D) and software products. The sub-classification of ER&D and software products is primarily to distinguish the pure-play service section and job roles. However, revenues are reported cumulatively.

- IT Services is the most dominant sub-segment and accounts for the largest share in both export and domestic markets. The segment contributes the majority of revenue to the overall sector besides being the fastest growing segment in the past five years

- The ITeS industry has played a pivotal role in driving the sector's growth. The segment offers its services to about 66 countries; more than 200 multinationals and global in-house centers are operating through the Indian subcontinent.

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                    ┌──────────────┐
                    │   IT & ITeS  │
                    └──────────────┘
     ┌──────────┬──────────┬──────────┐
┌─────────┐ ┌──────┐ ┌──────┐ ┌──────────────┐
│IT Services│ │ ITeS │ │ ER&D │ │Software products│
└─────────┘ └──────┘ └──────┘ └──────────────┘
                        └──────────┘
              ┌───────────────────────────────┐
              │ Sub-classification of ER&D and │
              │ software products is to        │
              │ understand the pure-play       │
              │ services and relate to job     │
              │ skills                         │
              └───────────────────────────────┘
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Sources: NASSCOM Strategic Review 2013, NASSCOM; KPMG in India Analysis

Industry overview

IT and ITeS contributed 8 percent of the total GDP in 2013

Contribution of IT & ITeS to India's GDP (FY08)
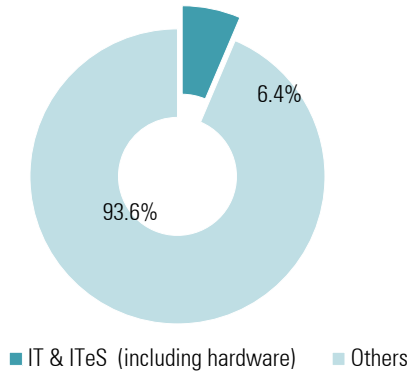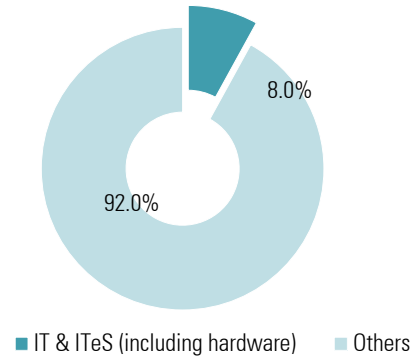
6.4%

93.6%

■ IT & ITeS (including hardware) ■ Others

Contribution of IT & ITeS to India's GDP (FY13)

8.0%

92.0%

■ IT & ITeS (including hardware) ■ Others

Direct employment generated by IT & ITeS (million)

2.2

3.0

2008   2013

Indirect employment generated by IT & ITeS (million)

9.5

8.0

2008   2013
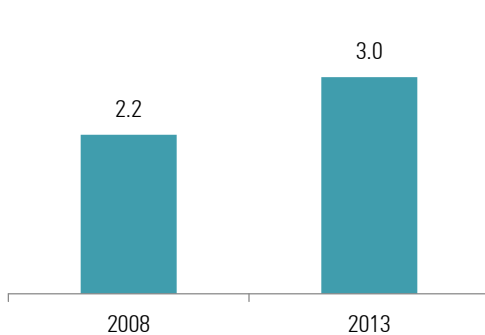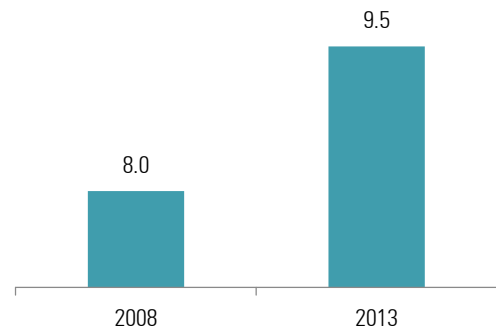
- The Indian IT & ITeS sector is pivotal for the Indian economy

- The sector's GDP contribution has increased from 1.2 percent in 1998 to 6.4 percent in 2008 to ~8.0 percent in 2013 driven by significant exports to western countries

- Moreover, the sector has provided new job opportunities and at present employs about 3 million people directly and 9.5 million indirectly

- The Cabinet in August 2014 has approved the ambitious 'Digital India' program, which aims to connect all gram panchayats by broadband Internet, promote e-governance and transform India into a connected knowledge economy.

IT Services is the dominant segment and accounts for the largest share

- In 2012, the Indian IT & ITeS sector crossed the US$100 billion milestone; it grew by almost 1,000 times in the last two decades on the basis of cost arbitration, skill availability and government support. The sector is estimated to grow at an 11.5 percent CAGR over 2008-2013 to reach US$108.4 billion.
- The sector generated about 69 percent revenues through exports where IT Services contributed 58 percent of total exports in 2012. The domestic market, which has started driving growth for the sector, has two dominating segment — IT Services and hardware
- Unlike in exports where hardware contributes the least (around 1 percent), in domestic market hardware is the largest revenue generating segment with a share of 40 percent in 2012.

Indian IT-ITeS (Domestic+Export) Revenues

Values shown (USD million): 40,418; 11,692; 47,099; 12,848; 49,690; 14,334; 59,035; 17,290; 68,784; 18,959; 75,833; 19,318 for Exports/Domestic across years 2008, 2009, 2010, 2011, 2012, 2013E.

Legend: ■ IT services ■ ITeS ■ Software products and ER&D
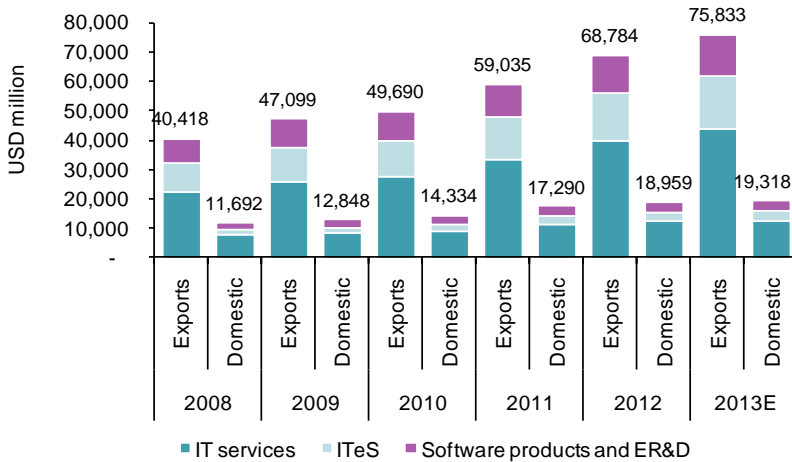
Note: Excludes hardware revenues

- IT Services is the most dominant sub-segment and accounts for the largest share in both export and domestic markets
- It is also the fastest growing segment (in the last five years) — from US$30 billion in 2008, it grew to US$56.3 billion in 2013 at a 13.4 percent CAGR
- The ER&D and software products segment was estimated to be worth US$17.9 billion in 2013 with ER&D's share to be about US$11.2 billion
- Telecom has adopted the ER&D segment the most; its share is expected to be about 30 percent, followed by semiconductors (20 percent), auto (12 percent), aerospace (6 percent) and consumer electronics (5 percent)
- The growth of software products is primarily the result of OSPD (outsourced software product development) as well as software testing services
- Top five players in the segment account for 50 percent of the market share

- The Indian IT & ITeS market can be segmented into exports and domestic, with exports accounting for the dominant share
- Industry revenues are estimated to touch US$108 billion in 2013 including hardware with the IT & ITeS (services) — estimated to be worth US$95 billion — to emerge as a services industry leader
- Besides providing employment to more than 12 million (both direct and indirect) professionals, the sector's GDP contribution stands at an impressive 8 percent for 2013
- While net domestic revenues have remained stagnant for the past three years, exports revenues have registered more than 10 percent growth
- However, the decline in the domestic revenue is largely attributed to the double-barreled challenge of the depreciation of the rupee against the dollar and shrinking IT budgets of companies
- The inverse relation between the rupee's worth and IT & ITeS exports is a major factor for the rise in exports revenues, leading to a decrease in domestic revenues

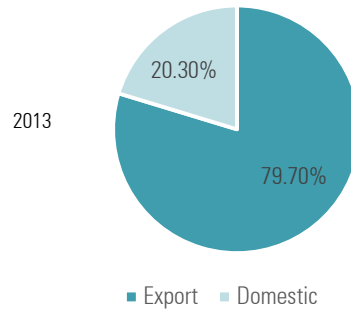# IT Services and software exports generate maximum employment for the sector

Revenue Break-Up Between Exports and Domestic

Total IT-ITeS Revenue = USD Billion 52.11

2009

22.44%

77.56%

■ Export ■ Domestic

Total IT-ITeS Revenue = USD Billion 95.15

2013

20.30%

79.70%

■ Export ■ Domestic
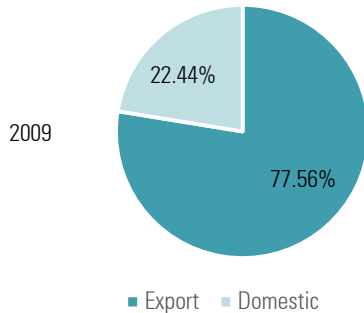
Note: Excludes hardware revenues

Indian ITeS export revenues

USD million

Year	Total
2008	9,915
2009	11,700
2010	12,401
2011	14,172
2012	15,915
2013E	17,848

■ Customer interaction & support   ■ Finance & accounting
■ HR administration   ■ Procurement & logistics
■ Knowledge services   ■ Other horizontal services
■ Vertical-specific BPO services
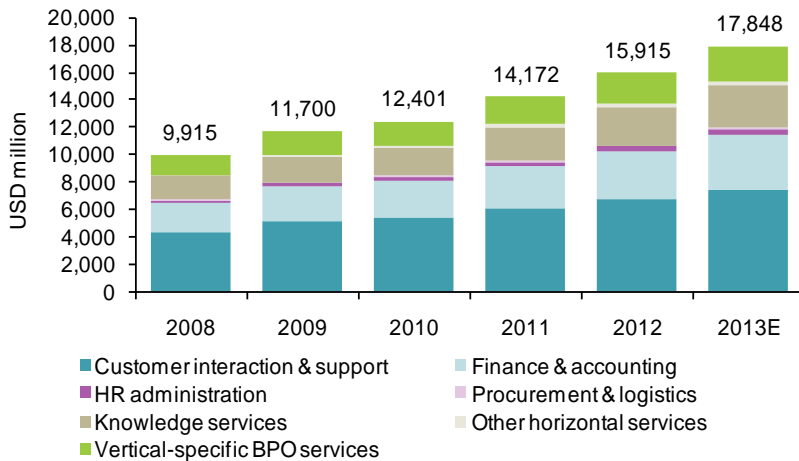
Professionals employed in Indian IT & ITeS sector

In '000

Year	Domestic market	ITeS export	IT Services & software exports
2008	450	635	877
2009	500	738	958
2010	527	770	1003
2011	562	826	1153
2012	601	879	1295
2013	640	917	1407

■ IT Services & software exports   ■ ITeS export   ■ Domestic market   ■
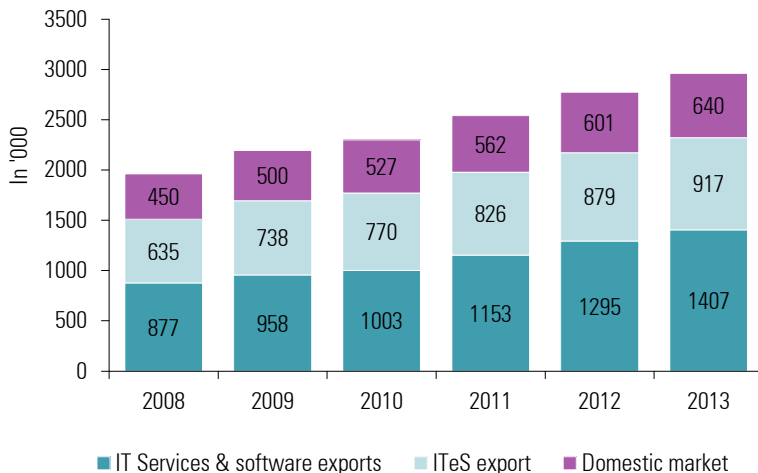
- Exports constitute the majority of ITeS' share and are estimated to be worth US$17.8 billion in 2013

- Customer interaction and support is the largest ITeS segment in terms of export revenues and its share in 2012 was about 40 percent; it grew at 10.6 percent in 2013 to maintain its leading position

- However, knowledge services constitute the fastest growing segment with an expected 15.2 percent growth rate in 2013

- Key services in this segment include business research, analytics, legal services, data management and market research

- In 2010, knowledge services exports were worth US$2 billion and they were estimated to reach US$3.2 billion in 2013 with business research constituting the maximum share of 42 percent

- The sector employs about 3 million professionals wherein most of the employment is generated by the exports segment

- Exports employs about 78 percent of the total workforce

- The domestic market's employment share is expected to increase with growth in the revenue share of the domestic market

Source: NASSCOM Strategic Review 2013

Indian IT-ITeS Forecast

- The IT & ITeS industry is expected to reach US$300 billion by 2020 driven by rising demand in domestic market, along with increasing IT Services exports. The CAGR for 2013-2020 is estimated to be 16 percent

Indian IT & ITeS Industry Revenues Forecast

USD billion

2009	2010	2011	2012	2013E	2020
69.4	74.2	88.4	100.9	108.4	300

CAGR: 16%

Note: Includes hardware revenues

Indian IT and ITeS (Domestic and Exports) Revenues

USD billion

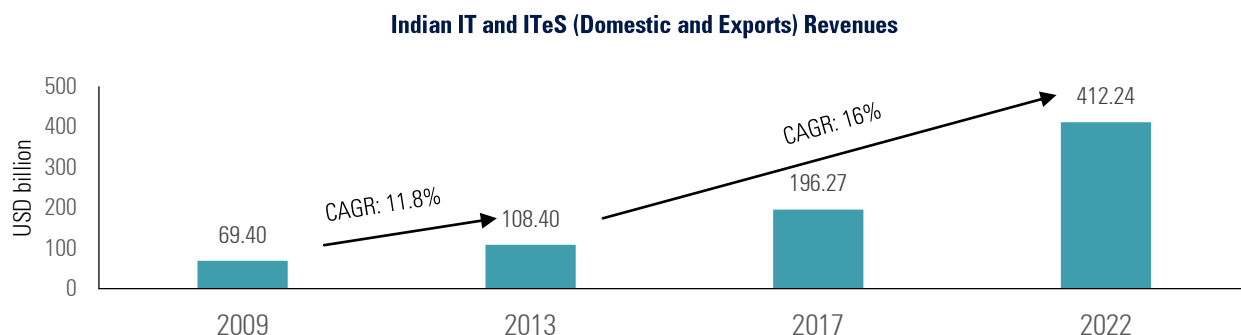| 2009	2013	2017	2022
69.40	108.40	196.27	412.24

CAGR: 11.8%

CAGR: 16%
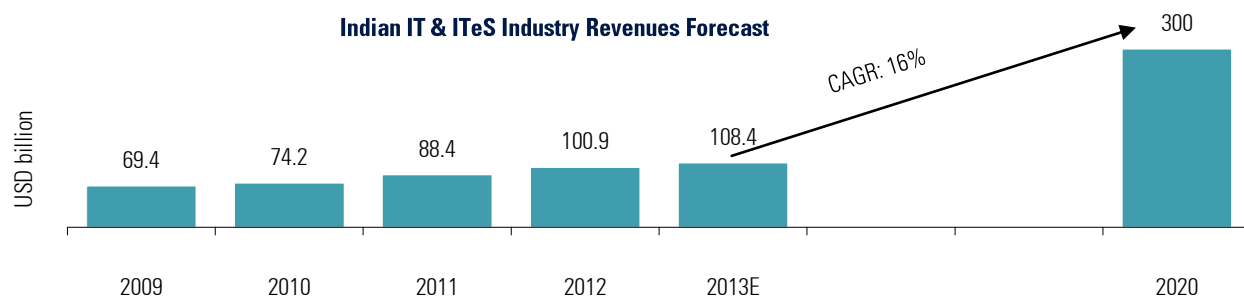
Until now, the sector has been primarily driven by the large amount of exports owing to cost arbitration. However, the following factors are also driving the sector:

- Global sourcing will continue to be the major growth driver for the industry
- Further, increased demand from the domestic government sector is fueling the domestic IT & ITeS sector
- More than 1,100 start-ups in the last five years have driven growth from supply side
- Continued initiatives by enterprises globally to facilitate the outsourcing of support function activities

- Further, the industry is set to achieve its 2020 target based on the emergence of disruptive technologies that would impact the Indian industry in different phases, i.e. from a window of 2–5 years to 5–10 years. Moreover, these technologies would also change the landscape of the job market with new job profiles and shifting opportunities. Following technologies are likely to impact the industry in forthcoming years:

High impact during the next 2–5 years	High impact in 5–10 years
Cloud Computing	Big Data
Near Field Communication (NFC)	Wearable User Interface
In-Memory Database Management System	Consumer 3D Printing
Virtual Assistants	Augmented reality

Source: NASSCOM, KPMG in India analysis

Geographic segmentation

- Businesses across the globe are taking measures to imbibe innovation in their operations to save cost while increasing efficiency and effectiveness. The IT & ITeS sector has played an important role in helping organizations achieve this objective
- With companies increasing the adoption of information technology in their business processes, IT & ITeS service providers are going the extra mile to facilitate this trend
- The emergence of new technologies (social media, mobile, analytics and cloud — for example, SMAC), rapid consumerization of IT and the penetration of technology even in the remotest areas are driving the sector's growth. The IT & ITeS segment, which had apparently slowed down by the economic crisis, registered a growth of 4.8 percent in 2013 to reach US$3.24 trillion
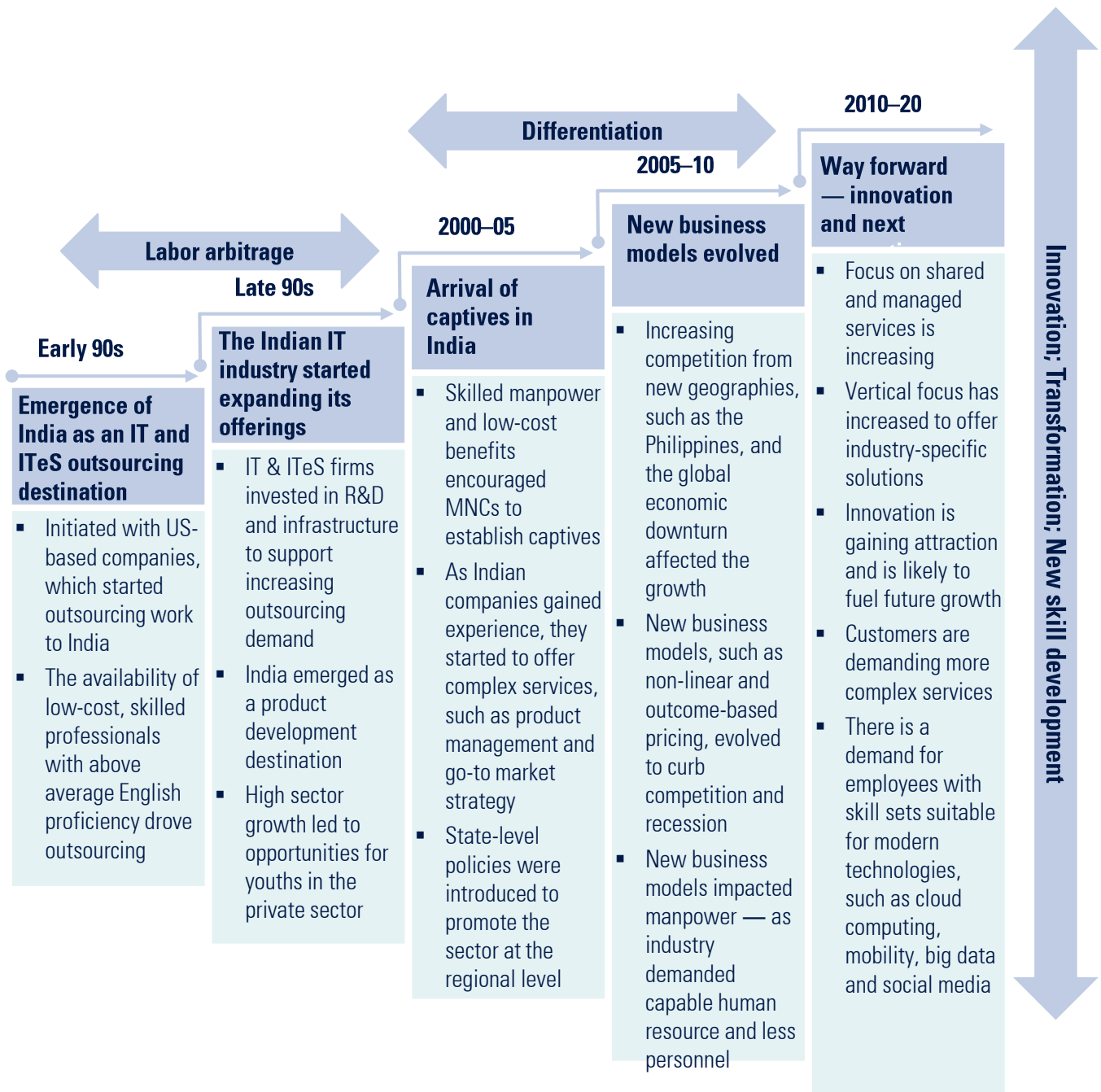
Worldwide IT & ITeS spend

Year	Hardware	IT services	ER&D	Packaged software	BPO
2011	748	627	1311	269	156
2012	797	648	1350	278	164

US$ billion

■ Hardware ■ IT services ■ ER&D ■ Packaged software ■ BPO
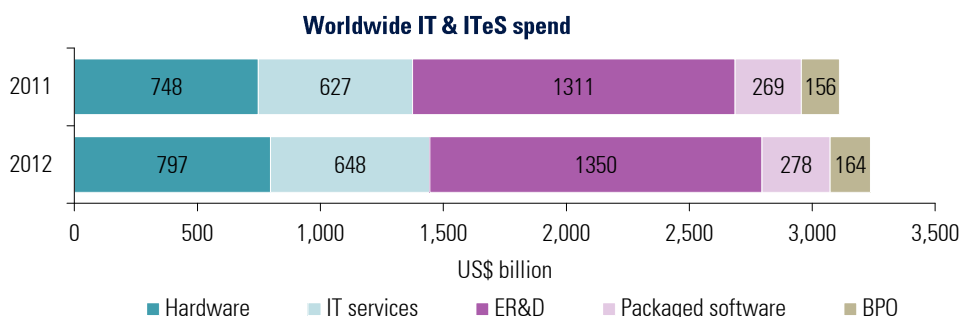
- The total IT spending is expected to reach US$3.87 trillion in 2014 and the enterprise software spending is likely to reach US$304 billion. The Americas and Europe, which are struggling with the after-effects of the economic slowdown, are employing IT & ITeS services to improve the situation. With the market share of IT spend unchanged at 45 percent, the Americas registered a growth of 5 percent in 2012 over 2011
- While the EMEA countries registered a negligible growth of just 1 percent, their market share declined to 35 percent in 2012 from 36 percent in 2011. On the contrary, with a growth of 6 percent, the APAC region grew 1.6x of the global growth and its market share increased by 1 percent to reach 20 percent in 2012
- The growth in the APAC region can be attributed to the demand for IT & ITeS services in emerging verticals such as healthcare, utilities and retail — driven by small businesses in Asian economies, particularly India
- The export of IT & ITeS services account for more than 70 percent of India's IT revenues. Geographically, the revenue of more than 50 percent Indian IT companies is generated from North America. However, in recent years, companies have witnessed increased demand for IT & ITeS services while exploring other geographies such as the Middle East, Africa and APAC countries. After the Americas, APAC has emerged as a high growth area for India with exports to the region increasing by more than 10 percent in 2012
- Globally, BFSI and manufacturing remain major customers of IT & ITeS services, accounting for 21 percent and 20 percent of the global IT spend, respectively, in 2012. However, the share of emerging verticals has been steadily increasing, as they demand about 33 percent of the total IT & ITeS services, followed closely by telecom (10 %) and government (16 %)
- The shift in the focus — away from traditional governance and toward e-governance — especially in the Indian subcontinent, is expected to boost government spending in future. 'Digital India' programme, which the government aims to implement in phases till 2018 would provide a lot of opportunities to the IT sector. Small and medium businesses (SMBs) are also shifting their focus to transform into technologically advanced companies and are expected to lead the demand for the IT & ITeS services in the coming years. With the onset of SMAC, SMBs' spending on IT is unlikely to decelerate in the near future — it touched the US$880 billion mark globally in 2012

Source: Gartner lowers global IT spend estimates for 2013 to $3.7 tn; Economic Times, accessed 27 September 2013; NASSCOM Strategic review 2013

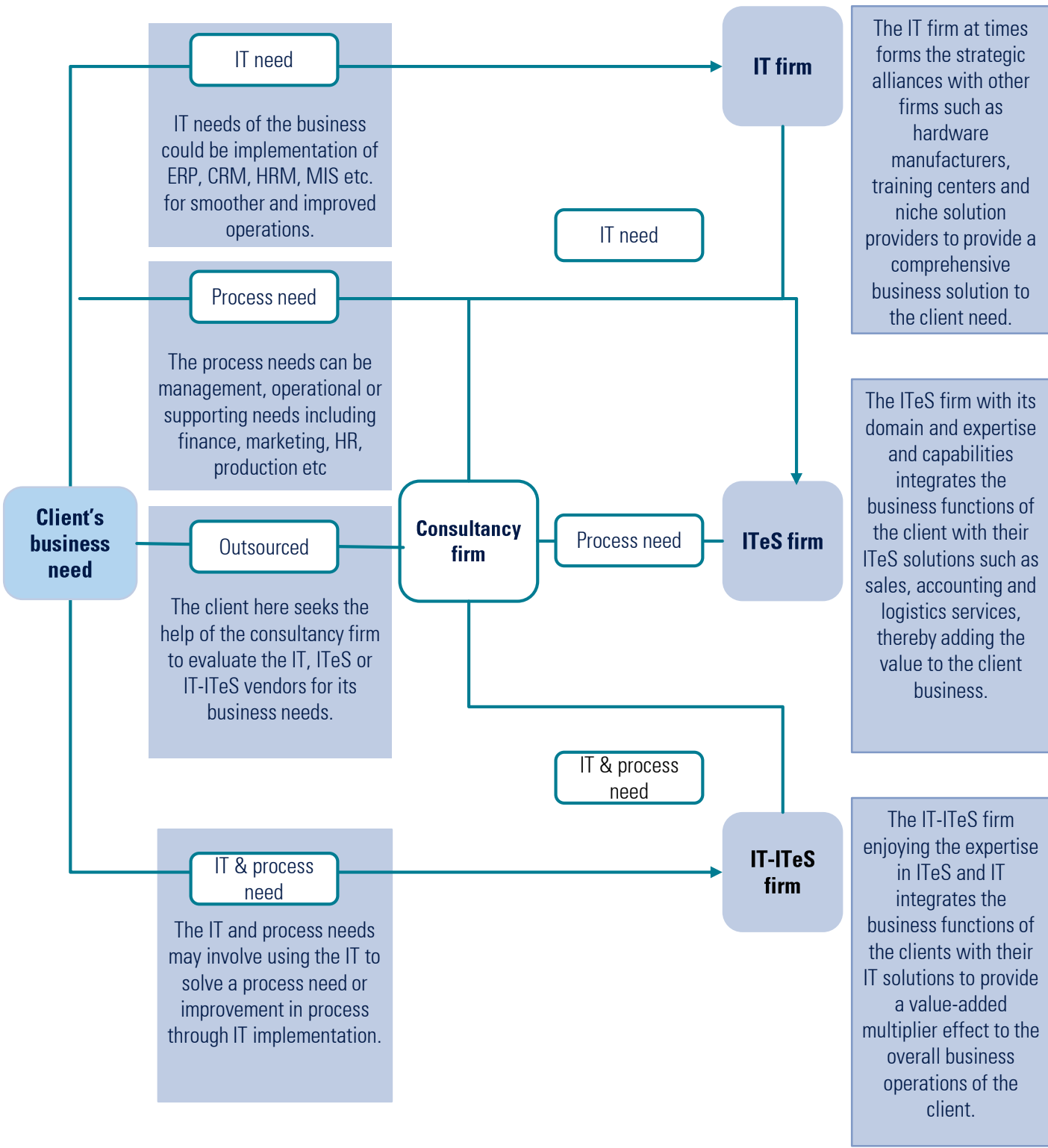# Innovation, transformation and development of new expertise are the focus areas for the Indian IT & ITeS industry

Evolution of IT & ITeS

Labor arbitrage

Differentiation

2010–20

Early 90s

Late 90s

2000–05

2005–10

Emergence of India as an IT and ITeS outsourcing destination

- Initiated with US-based companies, which started outsourcing work to India
- The availability of low-cost, skilled professionals with above average English proficiency drove outsourcing

The Indian IT industry started expanding its offerings

- IT & ITeS firms invested in R&D and infrastructure to support increasing outsourcing demand
- India emerged as a product development destination
- High sector growth led to opportunities for youths in the private sector

Arrival of captives in India

- Skilled manpower and low-cost benefits encouraged MNCs to establish captives
- As Indian companies gained experience, they started to offer complex services, such as product management and go-to market strategy
- State-level policies were introduced to promote the sector at the regional level

New business models evolved

- Increasing competition from new geographies, such as the Philippines, and the global economic downturn affected the growth
- New business models, such as non-linear and outcome-based pricing, evolved to curb competition and recession
- New business models impacted manpower — as industry demanded capable human resource and less personnel

Way forward — innovation and next

- Focus on shared and managed services is increasing
- Vertical focus has increased to offer industry-specific solutions
- Innovation is gaining attraction and is likely to fuel future growth
- Customers are demanding more complex services
- There is a demand for employees with skill sets suitable for modern technologies, such as cloud computing, mobility, big data and social media

Innovation; Transformation; New skill development

IT need

IT needs of the business could be implementation of ERP, CRM, HRM, MIS etc. for smoother and improved operations.

Process need

The process needs can be management, operational or supporting needs including finance, marketing, HR, production etc

Outsourced

The client here seeks the help of the consultancy firm to evaluate the IT, ITeS or IT-ITeS vendors for its business needs.

IT & process need

The IT and process needs may involve using the IT to solve a process need or improvement in process through IT implementation.

Client's business need

Consultancy firm

IT need

Process need

IT & process need

IT firm

ITeS firm

IT-ITeS firm

The IT firm at times forms the strategic alliances with other firms such as hardware manufacturers, training centers and niche solution providers to provide a comprehensive business solution to the client need.

The ITeS firm with its domain and expertise and capabilities integrates the business functions of the client with their ITeS solutions such as sales, accounting and logistics services, thereby adding the value to the client business.

The IT-ITeS firm enjoying the expertise in ITeS and IT integrates the business functions of the clients with their IT solutions to provide a value-added multiplier effect to the overall business operations of the client.

Source: KPMG in India analysis

Global competitiveness- India remains one of the favourable locations for IT outsourcing

Global Competitiveness

- India has leveraged its first-mover advantage and extensive skill base to maintain a significant share in the IT & ITeS market. Cost efficiency has been one of the key drivers for the industry

- Lucrative growth story and easy entry have driven other emerging nations, such as China, the Philippines, Indonesia and Czech Republic, venture into the market

- As the global economic scenario evolved, India was believed to be losing out on its cost advantage. However, the per FTE data for both IT and ITeS services is still competitive in comparison to other locations

- Tier 1 destinations, such as Bengaluru, are also providing 70–80 percent cost benefit over the costliest destination for IT Services

- Cost advantages are a result of strong cost management and mature client delivery capabilities, which make the overall process economical

- Indian professionals have a better command on English than those in other destinations; they are believed to be hard working, smart, flexible to work in different time zones as well as locations

- Other favorable components for the sector are attractive infrastructure costs, experience in the sector, availability of labor, education, quality of IT enabling infrastructure and government support for the sector

- The government has undertaken initiatives to develop the country's talent by introducing courses such as Bachelor of Computer Applications (BCA) and Master of Computer Applications (MCA), along with new IITs and an IT Research Academy

IT Services: Application Development and Maintenance
Operating cost per FTE US$ '000/annum, 2012

Location	US$
Singapore	80
Prague (Czech Republic)	59
Monterrey (Mexico)	51
Kuala Lumpur (Malaysia)	43
Beijing (China)	39
Bangkok (Thailand)	32
Buenos Aires (Argentina)	31
Manila (Phillipines)	26
Bengaluru (India)	22
Pune (India)	20
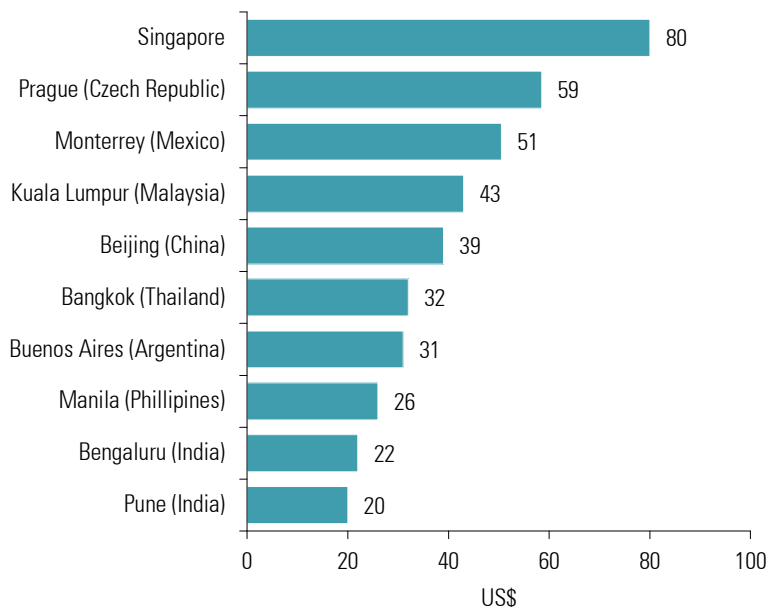
ITeS: Transactional Finance and Accounting
Operating cost per FTE US$ '000/annum, 2012

Location	US$
US Tier II	90
Sao Paulo (Brazil)	59
Prague (Czeck Republic)	41
Budapest (Hungary)	38
Monterrey (Mexico)	33
Shanghai (China)	30
Kuala Lumpur (Malaysia)	30
Bucharest (Romania)	29
Manila (Phillipines)	20
Bengaluru (India)	16
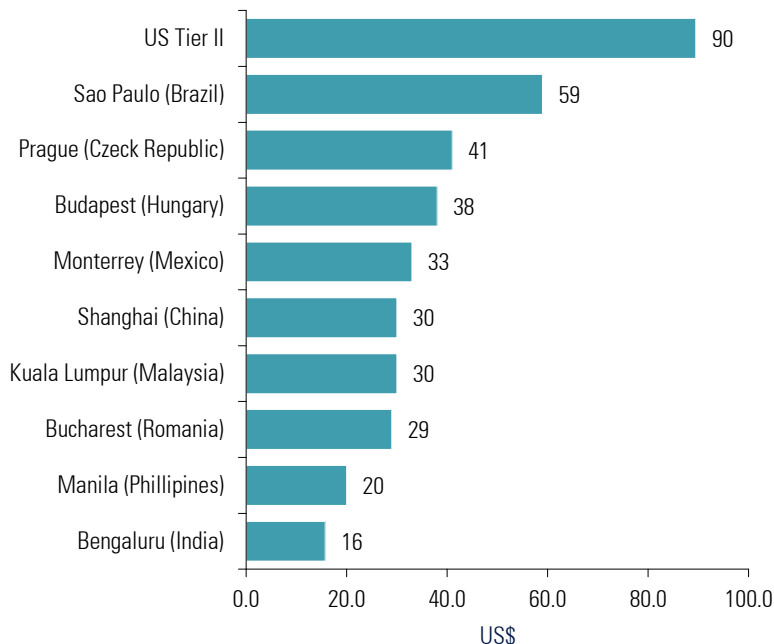
Source: Everest Research, NASSCOM, KPMG in India Analysis

According to Global Service Location Index 2011, India has been ranked as the most favorable location for IT & ITeS offshoring. The country was ranked ahead of China, Malaysia, Egypt and other emerging nations based on three broad criteria — financial attractiveness, people skills and availability, and business environment.

Rank	Location	Financial attractiveness	People skills and availability	Business environment	Total score
Global Service Location Ranking*					
1	India	3.11	2.76	1.14	7.01
2	China	2.62	2.55	1.31	6.49
3	Malaysia	2.78	1.38	1.83	5.99
4	Egypt	3.10	1.36	1.35	5.81
5	Indonesia	3.24	1.53	1.01	5.78
6	Mexico	2.68	1.60	1.44	5.72
7	Thailand	3.05	1.38	1.29	5.72
8	Vietnam	3.27	1.19	1.24	5.69
9	Philippines	3.18	1.31	1.16	5.65
10	Chile	2.44	1.27	1.82	5.52

Total score is out of 10 wherein 40 percent weightage is assigned to financial attractiveness and 30 percent each to the remaining parameters.

However, there are a few country-specific issues that are affecting its leading position. The country's business environment lags behind other nations' due to political instability, increasing regulatory burden and a complex tax structure. Moreover, as the industry is maturing, increasing costs in tier 1 cities and underdeveloped infrastructure in tier 2 zones is creating a gap. Companies should consider leveraging the cost benefit of these cities.

Source: "Offshoring Opportunities Amid Economic Turbulence GSL 2011," A.T.Kearney, 2011, p.2

The government is playing a pivotal role in driving the sector's growth

- National e-governance plan
- National Mission on Education through ICT
- Automation of the Public Distribution System
- National Knowledge Network
- Digital India programme

- Significant talent pool
- High ranking on the English proficiency index

- Indian firms are expanding globally
- Business processes are maturing
- Increasing customer focus driving ITeS services

Talent support

Government investments

Aspiring Indian enterprises

Key drivers for IT & ITeS adoption

Aggressive focus by service providers

New business models

Huge population base

- Focus on India as a primary market
- India-specific R&D
- Low-cost, customized products for the Indian market

- Managed services
- BOOT model
- Outcome-based projects
- Mobility, cloud and social networking technologies

- 25 percent growth in the number of technology graduates
- More than 800 million active mobile users
- More than 70 million active internet users in India

Demographic and workforce characteristics

- The sector is estimated to provide direct employment to about 3 million people in 2013 — up by 7 percent from 2012 — with a majority of opportunities in IT export services. The sector provides indirect employment to about 9.5 million people

IT & ITeS employment, 2013E

- 47%
- 31%
- 22%
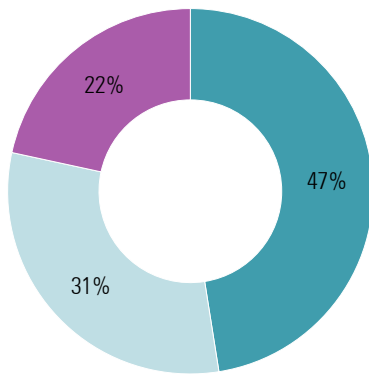
■ IT service exports ■ BPO exports ■ IT-BPO domestic

IT & ITeS skill base, 2013E

- 46%
- 30%
- 12%
- 5%
- 4%
- 3%

■ Other graduates

■ Engineering graduates

■ Postgraduates (Includes MBAs)

■ Financial specialists

■ Other specialists (doctors, lawyers, PHDs)

■ Others
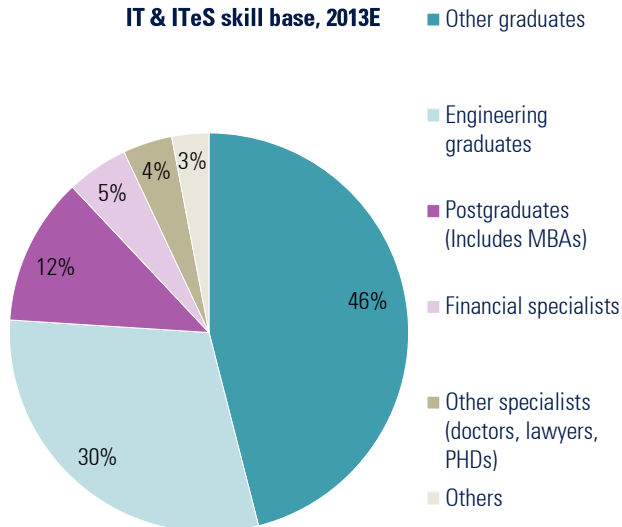
- The sector has also attracted a large number of foreign professionals — about 100,000 in 2013. Moreover, it has created several opportunities not only for engineering professionals, but also for graduates from varied fields, such as chartered accountants, medicine, law and management

- The sector has a relatively large number of women professionals — about 30–35 percent of the total workforce. This figure is expected to increase to five million by the end of 2020

- High number of women in the sector is a result of a working environment conducive to their professional growth and various women-focused initiatives — such as maternity leave, relaxation zones, medico/psycho counseling sessions, robust grievance redressal mechanism, committees to handle cases of sexual harassment at work and effective security and transport mechanism

SWOT analysis of the sector

Strengths	- Experience in the sector and first-mover advantage - Continued strong demand for IT & ITeS services from western countries - Strengthening the dollar against the rupee is driving labor arbitrage - Supportive state and national government policies - Large pool of educated and skilled personnel - Entrepreneurship culture in India leading to the emergence of a new set of providers - Establishment of an outcome-based pricing and a platform-based delivery mechanisms will strengthen India's position in the global market - Non-linear business models will reduce wage inflation pressure - Capitalizing on domestic demand - Rural BPOs and tier 2 and 3 cities will strengthen labor arbitrage
Weaknesses	- Inadequately skilled workforce for emerging technologies - Limited quality training institutes/courses - Lack of innovation - Increasing pressure of wage inflation - High dependence on the US for exports - Lack of infrastructure in tier 2 and 3 cities
Opportunities	- Large number of graduates who could be trained to be employable - Increasing demand in the domestic market - Demand from new geographies including Australia, Japan and the Middle East - Emergence of rural BPOs - Increased number of quality training institutes/courses - Move up the value chain to offer more complex services
Threats	- The political scenario after the 2014 elections may impact the industry - Lack of policy and regulatory support for innovation-related activities - Increasing competition from emerging low-cost destinations - Visa and immigration issues for the US

Source: KPMG in India analysis

Geographical clusters

Map legend:
- IT Services
- ITeS
- ER&D
- SPD
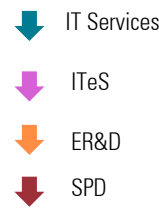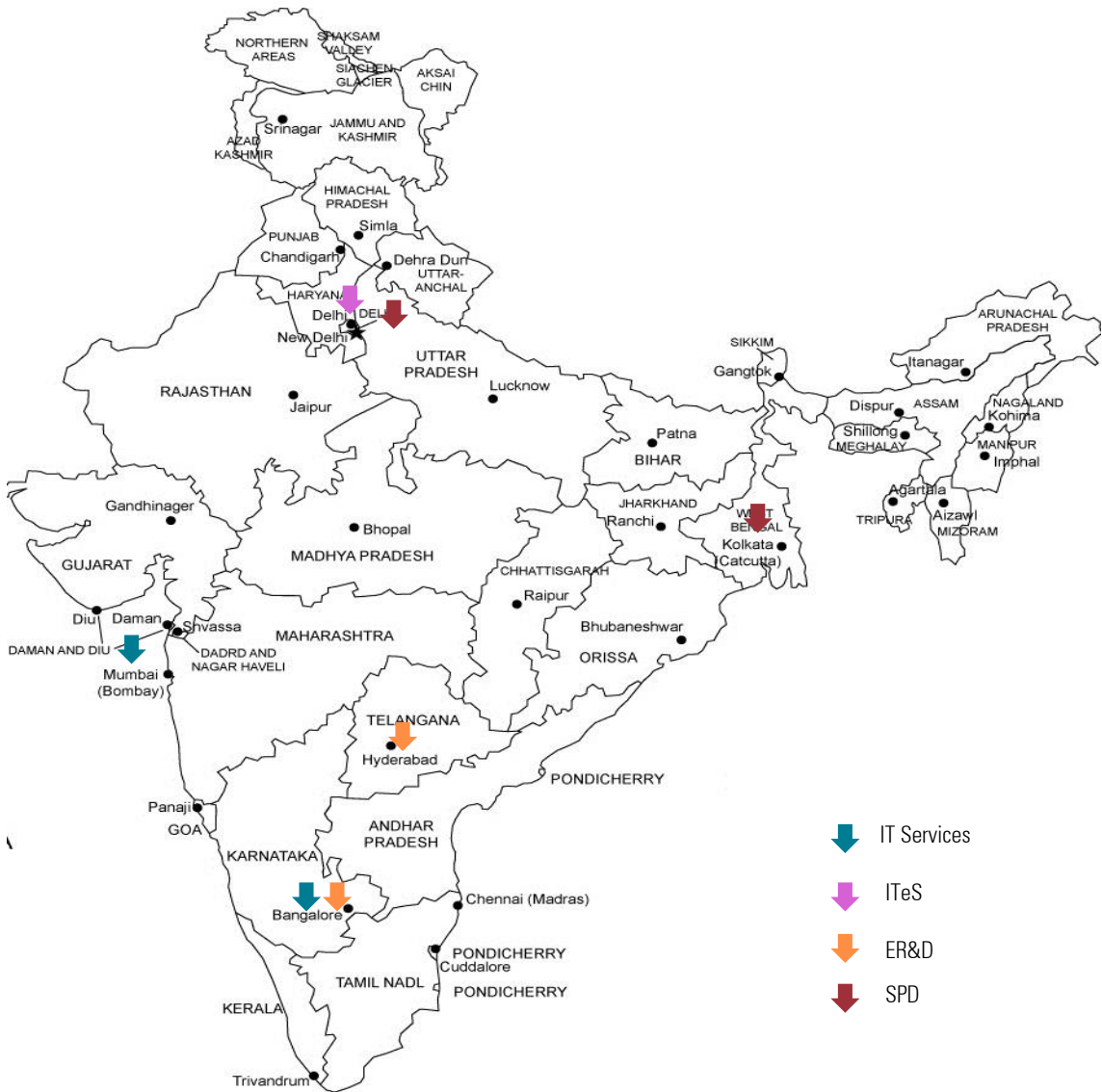
Note: Includes hardware

Geographic mapping of India IT & ITeS sector			
IT Services	**ITeS**	**ER&D**	**SPD**
▪ Has a strong presence in South and West India, primarily at tier I locations including Bangalore, Mumbai etc.	▪ North India with Gurgaon has the strongest hold in ITeS domain ▪ Also, has a significant presence in tier 2 cities across India	▪ Bangalore and Hyderabad has a strong hold in offering these services	▪ Along with South and West India, East India, primarily Kolkata has a strong presence in this domain ▪ Also, Noida has a significant presence

Source: NASSCOM Strategic Review 2013, NASSCOM

Increasing input costs in tier I cities are pushing companies to tier 2 and 3 cities

Regional competitiveness

- The Indian IT & ITeS sector primarily operates through six major states, including Karnataka, Andhra Pradesh, Maharashtra, Tamil Nadu, Haryana and Uttar Pradesh — major centers of top IT & ITeS firms such as TCS, Infosys, HCL, Tech Mahindra, Cognizant and Capgemini are based in these states. Also, a majority of these centers are based in tier 1 cities of these states, such as Bengaluru, Chennai, Hyderabad, Gurgaon and Noida

- As infrastructure facilities in tier 1 cities saturate and input costs increase, IT & ITeS companies are shifting their focus towards tier 2 and 3 cities. Some of these cities include Ahmedabad (Gujrat), Jaipur (Rajasthan), Nagpur (Maharashtra), Bhubuneshwar (Odisha), Mangalore (Karnataka), Guwahati (Assam) and Chandigarh

- To make the best use of this shift — by cashing in on the cost benefit of tier 2 and 3 regions — enterprises and state bodies should undertake the following initiatives:

  - Increase awareness on the sector through educational institutions at all levels to ensure skilled manpower for the sector
  - Develop an IT ecosystem for long-term sustainability of enterprises
  - Leverage IT & ITeS special economic zones (SEZ) to scale up businesses and receive tax benefits

Emerging IT & ITeS destinations in tier 2 and 3 towns

Srinagar
Ludhiana
Shimla
Chandigarh
Dehradun
Lucknow
Jaipur
Kanpur
Varanasi
Gwalior
Allahabad
Patna
Gangtok
Siliguri
Guwahati
Ahmedabad
Vadodra
Bhopal
Ranchi
Durgapur
Surat
Indore
Nashik
Raipur
Nagpur
Bhubaneswar
Pune
Aurangabad
Visakhapatnam
Goa
Vijayawada
Hubli-Dharwad
Mysore
Mangalore
Pondicherry
Coimbatore
Salem
Kochi
Tiruchirapalli
Thiruvananthapuram
Madurai

- Tier II cities
- Tier III cities

Top states by software exports (2011–12)

States	Export revenues (INR, billion)*
Karnataka	821.1
Maharashtra	462.6
Tamil Nadu	290.8
Andhra Pradesh	289.4
Haryana	135.1
Uttar Pradesh	109.9
West Bengal	592.0
Delhi	360.4
Kerala	198.2
Orissa	141.0

Source: NASSCOM Strategic Review 2013, NASSCOM; STPI Annual Report 2011 – 12 ; KPMG in India analysis

- The state has an impressive economic growth rate of 5.3 percent and its GSDP was is INR6,551 billion in 2012. Andhra Pradesh is a major IT hub in India and witnessed FDI inflows worth INR367.9 billion during 2000–2013
- Out of 115 SEZs in the state, 32 are dedicated toward the IT/ITeS sector. The state's revenue from the sector was INR532.5 billion in 2012 and provides employment to 300,000 professionals.
- The city of Hyderabad, which boasts of being home to the largest IT facility in the country, is the center of all IT/ITeS activities in the state
- A favorable investment climate — characterized by IT and other policies conducive to business, financial incentives and infrastructure support — has helped Andhra Pradesh receive major investments in the past few years

Investment area	Investments and initiatives
Equity/capital investments	▪ The state government has announced plans of allowing Saudi Arabia to invest in IT
STPs/ITIRs/SEZs/incubators/ corporate expansion	▪ The state government has announced IT industry policy incorporating a variety of monetary incentives for companies and has also proposed new IT corridors and zones in PPP in the state ▪ ITIR has proposed the development of an IT/ITeS facility in Visakhapatnam with an investment target of INR2,200.0 billion. The state government has announced plans to develop a plug-and-play IT incubation center in Vishakhapatnam. ▪ STPI has announced plans of establishing a data center in Hyderabad to address the requirements of MSMEs ▪ Infix, the global ITeS solutions provider, has established a new delivery center in Hyderabad with an investment of US$1 million
Tier 2 and 3 cities	▪ The IT industry of Tirupati has formed an association called 'Tirupati Information Technology Association (TITA)' to promote the city as an IT/ITeS destination ▪ ITsAP (Information Technology and IT-enabled services industry in Andhra Pradesh) plans to develop a startup ecosystem in Vishakhapatnam and Warangal to support IT growth. ▪ RuralShores, one of the largest rural ITeS companies, has signed an agreement with GMR to setup its rural ITeS unit in the SEZ at Kakinada
Skills development	▪ AP Society for Knowledge Networks has signed an MoU with Google India to train engineering students of Jawahar Knowledge Center college ▪ IBM has announced plans of setting up a business analytics lab in the school premises of Gitam School of International Business to enhance IT skills

The Andhra Pradesh government has identified 14 special focus areas and proposed guidelines specific to each area. These areas include:

1.	Start-up companies	2.	SMEs	3.	IT product/R&D companies	4.	SC/ST entrepreneurs
5.	Women entrepreneurs	6.	Animation, gaming and digital entertainment	7.	Promotion of IT incubation facilities at engineering colleges	8.	Tier 2 locations
9.	Tier 3 locations	10.	Promotion of women's participation in ICT sector	11.	Electronic hardware (non-hazardous)	12.	Corporate social responsibility
13.	eGovernance	14.	Engineering services				

Source: Andhra Pradesh state portal; Factiva

- Haryana constitutes just 1.5 percent of India's total geographic space but its GDSP contributes about 4 percent to the national GDP
- Home to more than 400 IT and ITeS companies, Haryana is the country's third-largest software exporter (worth US$5.2 billion). The state last updated its IT policy in 2000. Consequently, various incentives by the government have done little to augment the growth of the IT/ITeS industry

Investment area	Investments and initiatives
Equity/capital investments	- Bain capital has invested US$I billion in the Gurgaon-based ITeS company Genpact
STPs/ITIRs/SEZs/incubators/corporate expansion	- The US has expressed interest in investing in Haryana - Konica Minolta Business Solutions has invested US$1 million to establish its first digital imaging square at Cyber City in Gurgaon
Tier 2 and 3 cities	- Manesar is expected to generate an investment worth INR1,000.0 billion and create 1.5 million jobs by 2020
Skills development	- CMC Academy has set up an authorized training center in Gurgaon to provide job-enabled training

	IT Policy 2000
Skill and workforce development	- Implementation of the IT literacy plan by the government for its employees to achieve 100 percent IT literacy - The state plans to spread IT awareness in government schools with support from industry players - It plans to promote distance education through e-classrooms - The government will encourage the establishment of internet clubs and engineering institutes for students
Support to SMEs/MSMEs	- To support the growth of IT/ITeS companies, the government will establish hi-tech IT parks in Gurgaon, Panchkula and other regions in the state
Tax	- The state government has extended various concessions such as sales tax, registration on stamp duty, clearances and support and special incentives for mega projects.
Labor laws	- There are no clear regulations in the IT policy
IT investments	- Government initiatives - The government, in association with the private sector, will establish the Haryana state-wide area network (HARNET) for voice, data and video transmission - The government, in collaboration with the private sector, plans to enable the multifunctional SMART card-based citizen ID to get access to various services such as obtaining voter ID, making payments and obtaining ration cards - The state intends to develop Hindi language-based web applications to reach the common man - Formulation of an IT budget - An IT initiative fund will be formed with an initial corpus of INR100 million to foster IT innovation in administration reengineering, resource optimization, decision support system and other enabling technologies

Source: Department of Economic and Statistical Analysis, Haryana; Economic Survey of Haryana 2012-2013

- Karnataka's GDP has grown at a CAGR of 15.5 percent between 2005 and 2012. Dubbed as the Silicon Valley of India, software and hardware exports constituted about 42 percent (INR1,300.0 billion) of the state's revenue in FY12
- IT & ITeS, a major sector in the state, provides direct employment to more than 800,000 IT professionals. Forty-seven IT/ITeS SEZs, three software technology parks (STPs) and dedicated IT investment regions (ITIR), and a developed network of physical, social and industrial infrastructure make the state an IT hub
- The state's ICT roadmap 2020 proposes tier 2 and 3 cities of Mangalore, Mysore, Hubli, Dharwad, Gulbarga, Shimoga and Belgaum to be developed as potential ICT destinations by 2020

Investment area	Investments and initiatives
Equity/capital investments	▪ The UK Trade and Investment (UKTI) and Karnataka IT Venture Capital Fund (KITVEN Fund) plan to collaborate and co-fund start-ups and provide mentoring programs to entrepreneurs in Bengaluru ▪ The state government plans to develop an action plan to attract investments from Taiwan, especially in IT and hardware. An exclusive hardware park for Taiwanese companies has already been sanctioned near Bengaluru International Airport ▪ An independent angel investor has launched the city's first global accelerator program to support first 10 entrepreneurs with a US$50 million proposed fund
STPs/ITIRs/SEZs/incubators/corporate expansion	▪ The Government of Karnataka intends to establish an ITIR near Bengaluru. This is expected to have investments of US$19 billion by 2032 and generate employment for approximately 4 million people (1.2 direct and 2.8 million indirect) ▪ The software technology parks of India (STPI) will establish a 50,000 square feet incubation facility in Mysore to promote the city as a new IT destination ▪ NASSCOM, in association with the Karnataka government, has set up a plug-and-play facility, titled Startup Warehouse, under its '10,000 Startup' initiative for startups in Bengaluru ▪ SAP Labs India plans to expand its facility in Bengaluru by constructing a LEED-certified building near its existing center ▪ There are plans of establishing an IT park in the Udupi district too ▪ The Karnataka State Electronics Development Corporation Limited (Keonics) plans to establish an IT park and an incubation center in Belgaum
Tier 2 and 3 cities	▪ The state government plans to organize an investors' conference in Hubli to attract IT/ITeS investments in tier 2 and 3 cities, such as Mangalore, Mysore, Hubli-Dharwad and Gulbarga ▪ The Brigade Group intends to construct a 2.5 million square feet of IT office space at the IT-SEZ being constructed at Ganjimath, en route Moodbidri, a tier 2 city near the Mangalore international airport ▪ The state has sanctioned 50 acre land to NR Narayana Murthy to construct an Infosys campus in Hubli that can cater to 10,000 employees
Skills development	▪ There are plans of establishing an INR1.3 billion worth Indian Institute of Information Technology (IIIT) in Dharwad, which will have a mobile IT lab to enhance IT knowledge of school children.

- Despite attracting investments, Karnataka faces some challenges that are hampering the future growth potential of the sector. Political instability, constant tussle over natural resources (for example, water), procedural and other bureaucratic delays and some recent scams have, over a period of time, decreased the rate of project execution

- However, with the formation of the Karnataka Information Communication Technology Group 2020, the government plans to address these roadblocks, and exploit the potential of the state to help it become a global leader in the industry

Source: Karnataka's roadmap to undisputed global leadership in ICT by 2020, Karnataka Information Communication Technology Group

ICT Policy 2011	
Skill and workforce development	▪ The state government plans to popularize the 'Bangalore Welcome Mat' program, which promotes the cosmopolitan nature of the city, availability of high-end skilled workforce and low real estate cost to attract expatriates to work in Karnataka ▪ The state collaborates with industry players and educational institutes to establish higher educational institutes and research labs; develop school and college curricula; establish and promote e-learning centers as well as spread IT awareness among people in semi-urban and rural areas ▪ The state intends to promote Centers of Excellence in about 100 engineering colleges across Bellary, Gulbarga and Shimoga districts ▪ It provides online access to Kannada encyclopedia and textbooks across disciplines in government schools
Support to SMEs/ MSMEs	▪ The state announced the establishment of innovation parks based on the PPP model and comprising 'plug-and-play' office space to provide modern technology, equipment and funding to MSMEs ▪ Various incentives will be provided under the Karnataka Industrial Policy of 2009–14 to encourage and facilitate the establishment of MSMEs in MSME-dedicated SEZs in Mysore, Mangalore, Hubli-Dharwad Gulbarga and Belgaum regions ▪ The state government will favor MSMEs in government procurement orders and encourage big companies to collaborate with MSMEs for such engagements
Tax	▪ Entry tax (ET) exemptions on 'plant and machinery and capital goods' includes: ▪ Hundred percent exemption from the payment of ET for MSMEs, large and mega projects for defined zones for an initial period of three years from the date of commencement of the project to its execution and for five years on select raw materials, input and component parts and consumables from the date of the commencement of commercial production ▪ Hundred percent exemption from ET for 'export-oriented units' (EOUs) for an initial period of three years from the date of the commencement of project implementation irrespective of zones ▪ Exemptions from other duties and taxes include: ○ An interest-free loan on VAT on investments worth INR100 million to more than INR30 billion and Hundred percent exemption from electricity tax/duty for the initial period of five, four and three years for zones 1,2 and 3
Labor Laws	▪ The state government will further simplify procedural requirements for the filing of returns, record management and annual returns by IT companies ▪ The state encourages e-filing of returns in consultation with the Department of Factories and Boilers and the labor department ▪ The state government will render assistance to disabled people in accordance with the provisions of the Persons with Disability Act 1995
IT investments	▪ The Information Technology Investment Region (ITIR) Scheme: The state aims to promote IT exports and generate employment. The state government will establish, provide infrastructure and create an investor-friendly environment in the region dedicated to IT/ITeS activities ▪ Financial incentives: To encourage MSMEs, the state government will provide zone-specific financial incentives on the value of fixed assets (VFA) under the Karnataka Industrial Policy of 2009–14 ▪ Entrepreneurial support: the state government will establish a research hub, a prototype and a testing laboratory, and provide funding worth up to 50 percent of the project costs. The remaining funds will be mobilized through the industry or PPP business mode

Source: Advantage Karnataka, accessed 18 September 2013

- The state accounts for about 15 percent of India's total GDP with a GSDP, which crossed INR12,484.5 billion in 2012
- Maharashtra is fast catching up with Karnataka in software exports — its contribution in 2012 was about 23 percent. To facilitate the development of the IT industry in the state, the Government of Maharashtra has made special provisions for IT infrastructure development in its IT/ITeS Policy 2009

Investment area	Investments and initiatives
Equity/capital investments	- IDFC's private equity arm plans to buy an SEZ for INR6,000 million for software companies in Pune from Paranjape Schemes - Blackstone invested INR4,500 million in the country's first notified IT SEZ — Eon Free Zone
STPs/ITIRs/SEZs/incubators/ Corporate expansion	- The Board of Approval (BoA) on SEZ has approved the plan of setting up two IT projects, one in Maharashtra, with a total investment of INR64 billion. - Raheja Group plans to establish an IT/ITeS park in Mihan SEZ in Nagpur. Wipro, TCS, Infosys and Mahindra Satyam have agreed to set up their offices in the SEZ - The Nashik Industries and Manufacturers Association (NIMA) has submitted a memorandum demanding the Nashik Municipal Corporation to establish an IT park. - Mahindra Satyam to invest INR8,000 million by 2015 to create an additional capacity of 15,000 seats - Cognizant has expanded its facility by adding 230,000 square feet office space in Airoli, Navi Mumbai - Jetking Infotrain Ltd plans to establish an ITeS company with an initial investment of INR50 million - Maveric Systems has established a delivery center in Mumbai
Tier 2 and 3 cities	- The government has signed MoUs for 24 mega investment proposals in Vidarbha worth INR185 billion - Six IT companies have announced plans to start operations in Nashik
Skills development	- TCS has collaborated as an equity investor to establish an IIT in Nagpur in a INR1,000 million project

- The government, which is burdened with unoccupied SEZs, land acquisitions problems and the surrendering of SEZs by developers due to the economic slowdown, is taking initiatives to boost investor sentiment
- To put the state on the world map, the government is proactively promoting 'Brand Maharashtra'. Its two-day conclave called 'Advantage Vidarbha' in 2012 witnessed investment proposals worth INR185 billion on the first day itself

IT & ITeS Policy 2009	
Skill and workforce development	▪ Agencies such as The Maharashtra Knowledge Corporation Limited and The Maharashtra State Board of Technical Education will collaborate with industry agencies, such as NASSCOM, to initiate training-based certification and placement programs ▪ Employment-oriented institutes such as centers of excellence and R&D centers will be established in low human development index (HDI) districts to impart IT skills ▪ Universities and industry agencies will collaborate to train professionals in animation, visual effects, gaming and comics (AVGC)
Support to SMEs/MSMEs	▪ The government will extend benefits, such as up to 50 percent reimbursement of the patent filing cost, to MSMEs
Tax	▪ The state will offer exemption from octroi/entry tax and other cess or tax ▪ As recommended by the relevant empowered committee, it will charge minimum rates on work contract tax on the annual maintenance agreements of IT/ITeS companies ▪ It has allowed the establishment of IT/ITeS units (except IT and telecom hardware) in any zone, including residential and no-development zones
Labor Laws	▪ IT/ITeS companies can maintain employee-related records electronically and accept the e-filing of returns ▪ IT/ITeS companies will enjoy relaxations under the Shops and Establishment Act with regard to working hours, work shifts and employment of women
IT investments	▪ Entrepreneurial support: Incubation centers, especially for small enterprises, will be established to exchange and disseminate knowledge between the academia and the industry ▪ Tier 2 and 3 cities: Tier 2 and 3 cities, such as Nashik, Aurangabad, Nagpur and other low HDI districts, will be promoted by offering lands at low rates to encourage the establishment of IT parks and IT/ITeS units. A city internet portal for Nashik, Aurangabad and Nagpur will be developed to disseminate comprehensive information on infrastructure and other government initiatives ▪ Infrastructural benefits: The Maharashtra government has outlined some benefits — such as the availability of additional floor space index, residential and recreational support facilities and establishment of IT parks — to encourage the establishment of IT/ITeS companies

Source: Progressive Maharashtra, accessed 19 September 2013

- Tamil Nadu is the fourth-largest Indian state in terms of GDP (INR7,231.1 billion) and its GSDP has demonstrated a 13 percent y-o-y growth and a CAGR of 15 percent between 2003 and 2013
- Second only to Karnataka in software exports, Tamil Nadu provides employment to 375,000 professionals in the IT/ITeS sector
- Besides Chennai, Coimbatore, Madurai and Trichy are some upcoming ICT destinations in the state. The TIDEL Park in Chennai, spanning 1.28 million square feet, is one of the largest IT facilities in India

Investment area	Investments and initiatives
Equity/capital investments	▪ Center for Entrepreneurship Development and Incubation (CEDI) of National Institute of Technology (NIT) Trichy has announced seed money up to INR2.5 million ▪ Ventureast and responsAbility have invested US$1.3 million in DesiCrew Solutions, a Chennai-based rural ITeS startup
STPs/ITIRs/SEZs/incubators/corporate expansion	▪ The state government has announced plans to establish nine industrial parks ▪ Tidel Park has announced its plans to invest INR100 million to establish an incubation facility ▪ Cognizant has announced plans to expand the size of its Chennai SEZ by 50 percent ▪ Latent-View, an analytics firm, has announced plans to expand its operations by establishing a new office with an estimated investment of INR120 million in Ramanujan IT city
Tier 2 and 3 cities	▪ Syntel has announced plans of establishing a new global delivery center in Tirunelveli — a tier 2 city
Skills development	▪ The Electricity Corporation of Tamil Nadu (Elcot) has announced incubation and training centers in Elcot's SEZ for MSMEs in the IT sector

- The state, whose IT exports crossed INR420 billion during 2011–13, has been struggling to seek investments and aims to leverage government initiatives to promote the IT/ITeS industry
- The lack of promotion of under-utilized SEZs and IT parks by the government, rise in property taxes for IT companies and the economic slowdown are responsible for low investments in Tamil Nadu as compared to its other states

	ICT Policy 2008
Skill and workforce development	▪ A special task force will be established by the government to help technical institutes transform into centers of excellence. It also plans to set up finishing schools with a special focus on the weaker sections of society ▪ The state government will encourage the industry to formulate an ICT aptitude test to be used for recruitment ▪ The state government has proposed the inclusion of industry representatives in the syllabus committee to align universities' curricula with industry requirements ▪ The government will encourage professionals to learn foreign language to tap opportunities in international markets
Support to SMEs/ MSMEs	▪ Though the government has not outlined any specific policies to support MSMEs, various financial and administrative incentives have been proposed for IT/ITeS facilities based on the size of investment, location of the facility and employment generation
Tax	**Special tax incentives (capital subsidy and electricity tax exemption) have been provided based on the following**: ▪ Investment starting from INR50–2,000 million and above ▪ Direct employment for 100–400 workers and above ▪ Location of a company in tier 2 and 3 regions
Labor laws	▪ The government will give special awards to IT companies that will employ physically-challenged people ▪ Specific software will be developed for physically-challenged people in collaboration with leading institutions
IT investments	**Entrepreneurial support** ▪ The government intends to promote entrepreneurship spirit in the state by encouraging institutes to establish incubators with committed resources and introduce entrepreneurship as a subject. Incentives ▪ The government plans to provide a structured package of incentives to IT/ITeS companies in Chennai, Tiruvallur and Kancheepuram districts on a case-by-case basis ▪ It has relaxed the floor space index (FSI) by as much as 100 percent for all designated IT/ITeS parks across the state **Tier 2 and 3 cities** ▪ The government has proposed incentives such as subsidy on capital and exemption from electricity tax to all IT/ITeS units based on investments in fixed assets in tier 2 and 3 regions ▪ An additional capital subsidy of 50 percent over and above the eligible limit will also be provided to IT/ITeS companies in designated SEZs. **Civic infrastructure** ▪ The state plans to develop a master plan for infrastructure development of ICT destinations, namely Coimbatore, Madurai, Trichy, Tirunelveli, Hosur and Salem ▪ It plans to provide a single-window mechanism to all IT/ITeS companies in these destinations

Source: Investing in Tamil Nadu, accessed 18 September 2013

- One of the largest Indian states in terms of GSDP (INR7,764.3 billion in 2013), Uttar Pradesh has made a mark in the IT/ITeS industry rather quickly. The state has a population of over 200 million and its literacy rate is 70 percent

- Noida and Greater Noida are major IT hubs in the state and contribute about 5 percent to India's IT exports. The January 2013 data from SEZ India reveals that Uttar Pradesh has 21 SEZs that are majorly located in and around Noida and Greater Noida

- In the past few years, various major IT/ITeS companies across India have expressed interest in setting up shop in the state

Investment area	Investments and initiatives
Equity/capital investments	- hCentive has announced plan to invest INR5 billion to develop infrastructure for its Indian operations
STPs/ITIRs/SEZs/incubators/ corporate expansion	- NIIT Technologies has announced plans to expand its Noida campus by investing INR1 billion and hiring 800 professionals - Ansal API has announced plans of setting up a corporate park in Noida
Tier 2 and 3 cities	- The state government has announced its plan of developing an IT city in Lucknow spanning 100 acre - Infosys plans to set up a software development center in Lucknow. - HCL intends to establish offices in Lucknow and Agra
Skills development	- The state government has announced plans of setting up an Indian Institute of Information Technology (IIIT) - Oracle has announced its plan of introducing computer courses in schools and higher educational institutes

- Recently announced IT policy and infrastructure initiatives such as the establishment of new power plants, construction of highways and allocation of land for SEZ development are expected to help Noida and Greater Noida emerge as major IT hubs in India after Bengaluru

IT Policy 2012	
Skill and workforce development	▪ To facilitate exchange of ideas and promote collaboration with IT experts, the government will establish centers of excellence across the state. ▪ It plans to develop a repository of IT experts and forecast demand for IT manpower ▪ The government intends to collaborate with renowned Indian and foreign educational institutes to improve educational standard in the country ▪ The government aims to establish skill development centers based on the PPP model to encourage the youth to improve IT capabilities ▪ It intends to collaborate with NASSCOM to develop and map the training needs with industry requirements ▪ The government would collaborate with leading industry players through knowledge center programs to help skilled resources get employment in the industry
Support to SMEs/MSMEs	▪ The government has outlined a package of structured incentives for IT/ITeS companies based on investment size and location of companies
Tax	▪ IT/ITeS companies with investments of more than INR50 million can avail interest-free loan equivalent to the amount of VAT and central sales tax ▪ The government will give special incentives based on the size of investment to IT/ITeS companies on a case-by-case basis.
Labor Laws	▪ The government will give 50 percent incentive on expenditure for five years on account of contribution towards employee PF and state insurance schemes
IT investments	▪ Entrepreneurial support ▪ The state intends to attract investment from entrepreneurs by creating an investor-friendly business environment ▪ Tier 2 and 3 cities^^ ▪ The state aims to develop and improve civil infrastructure, such as roads connecting IT hubs, cities and airports, to attract IT investments ▪ IT cities will be established in Lucknow and Agra for IT/ITeS companies ▪ The state intends to leverage the Universal Service Obligation Fund of India (USOF) funds to improve connectivity in rural areas ▪ Registered IT companies will be allowed 100 percent additional floor space index for residential/official purposes in tier 2 and 3 cities ▪ Public private partnership (PPP) model ▪ Leverage various PPP models such as BOT, BOO and BOOT for the growth of the IT/ITeS industry ▪ The state plans to encourage investments in PPP projects to support facilities such as premier schools and hospitals to foster growth of IT projects

**The IT policy of Uttar Pradesh focuses on six strategic areas to achieve desired objectives. These include economic transformation; people empowerment and engagement; innovation; infrastructure development; human capital development and bridging the digital divide.
^^Classification of cities

        Tier 1: Noida and Greater Noida
        Tier 2: Lucknow, Agra, Kanpur, Allahabad, Meerut, Varanasi and cities with over 2 million population
        Tier 3: cities with less than 2 million population

Source: Udyog Bandhu, accessed 19 September 2013

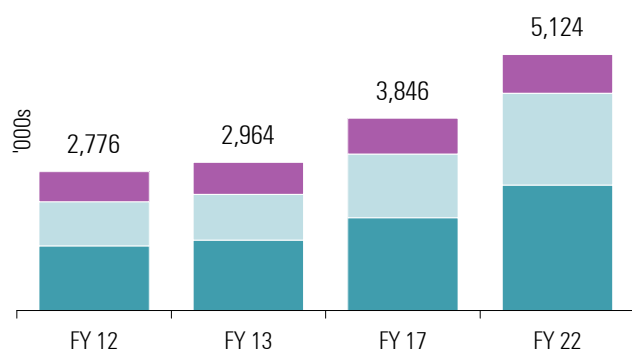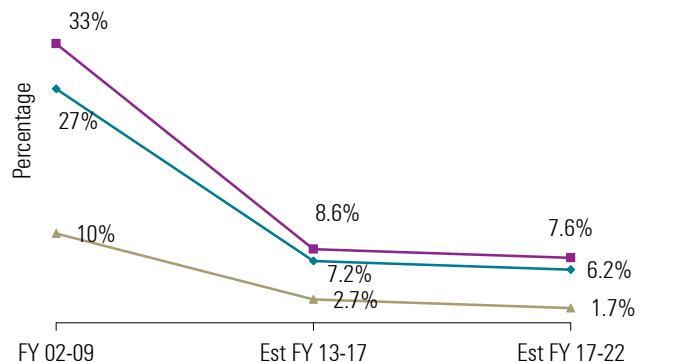# Incremental human resource requirement (2013-17, 2017-22) and skill gaps

Employment in the IT & ITeS sector

- The Indian IT & ITeS industry employs about 3 million directly and 9 million indirectly

- A majority of employment is generated through the exports business

- Exports contribute about 78 percent of the total employment in the sector

- Employment growth was high during FY02–09 period, however, it started settling down with the increasing maturity of the sector and the evolution of non-linear business models

- The sector is expected to employ about 5.1 million professionals directly in FY22 and exports are likely to continue to dominate

IT & ITeS industry employment forecast

IT & ITeS industry employment growth

Description	2010	2012	2013
Direct employment	2.3	2.8	3.0
Indirect employment	8.2	8.9	9.0
Ratio (indirect: direct)	3.6	3.2	3.0

Source: NASSCOM Strategic Review, 2013, NASSCOM; KPMG in India analysis

Employs a mix of graduates including engineering, MBAs and commerce graduates

IT-BPO skill base, 2013
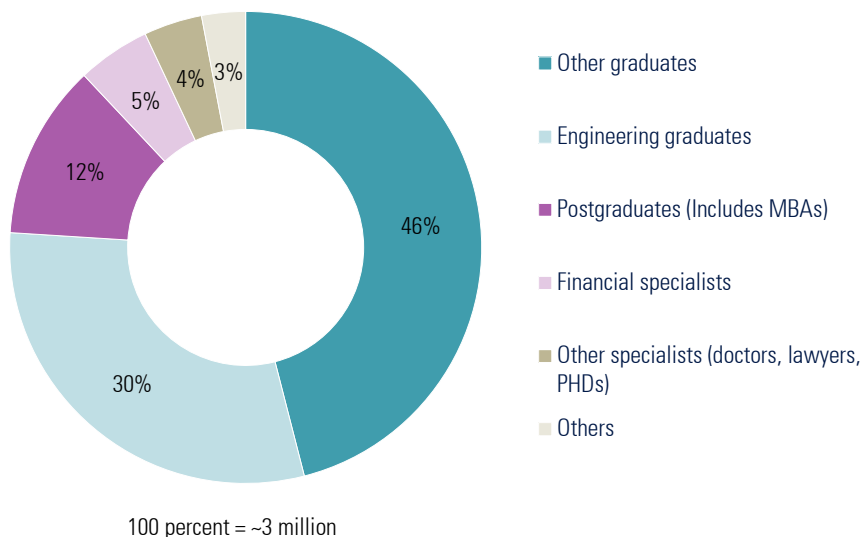
- Other graduates — 46%
- Engineering graduates — 30%
- Postgraduates (Includes MBAs) — 12%
- Financial specialists — 5%
- Other specialists (doctors, lawyers, PHDs) — 4%
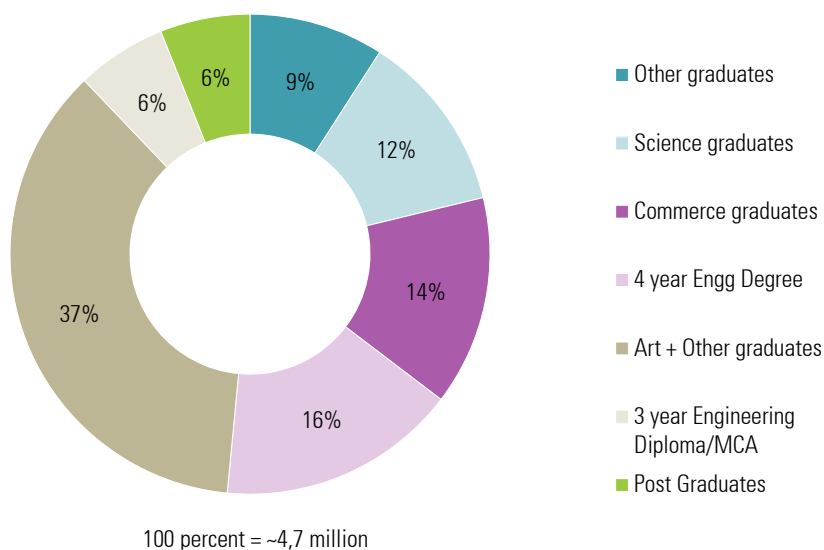- Others — 3%

100 percent = ~3 million

Key takeaways

- The sector has a variety of skill sets to offer to a wide array of services across verticals

- It has a skill base of engineering graduates to offer complex IT services

- Further, doctors, lawyers and PHDs enable vertical industry expertise

- A significant base of financial specialists is employed in the sector, as it generates a sizeable amount of revenues from the BFSI sector

Key takeaways

- India has a diverse and the world's largest employable talent pool

- This talent pool was estimated to have about 4.7 million professionals in 2013

- About one-fourth of the available talent pool can be directly employed in the sector, which includes engineering graduates and MCA graduates

- However, a large number of graduates are not skilled for new or complex service offering and require skill-based training

Talent output, 2013

- Other graduates — 9%
- Science graduates — 12%
- Commerce graduates — 14%
- 4 year Engg Degree — 16%
- Art + Other graduates — 37%
- 3 year Engineering Diploma/MCA — 6%
- Post Graduates — 6%

100 percent = ~4,7 million

Key job roles

Top 20 job roles by sub-sector							
Job roles/ occupation	**Sub-Sector**	**Alignment with other sectors**				**Other occupations**	**Other industry**
		ITS	**ITeS**	**SPD**	**ER&D**		
Application development	ITS	✓	✓	✓	✓	IT consulting, project/program management, sales and pre-sales, testing and QA, application maintenance, application deployment, IMS and information security	IT-specific roles in any industry
Application deployment	ITS	✓	✓	✓	✓	Project/program management, sales and pre-sales, testing and QA, application outsourcing	IT-specific roles in any industry
Data scientists	ITS		✓			NA	Statistics/MIS/ analytics-specific roles
Infrastructure management services (IMS)	ITS	✓	✓	✓	✓	IT consulting, project/program management, sales and pre-sales, testing and QA, application outsourcing, IT services management, application deployment, IT support services/help desk and information security	Infrastructure department in all industry, esp. media, telecom and BFSI
Information security	ITS	✓	✓	✓		IT consulting , project/program management, sales and pre-sales, application development, testing and QA, IMS and IT support services/help desk	Information security roles in any industry, esp. BFSI, media and telecom

Source: NASSCOM; KPMG in India analysis

Top 20 job roles by sub-sector						
Job roles/ occupation	**Sub-Sector**	**Alignment with other sectors**				**Other occupations**	**Other industry**
		ITS	**ITeS**	**SPD**	**ER&D**		
Analytics	ITeS	✓	✓		✓	Knowledge services — research	Bank, retail, insurance, manufacturing
Customer relationship management	ITeS	✓	✓	✓		Supply chain management, finance and accounting (TP&FP)	Internal technical support across industry
Finance and accounting	ITeS	✓	✓	✓		Analytics, knowledge services — research, supply chain management	Banks, retail, insurance, manufacturing
Health services	ITeS	✓	✓			Analytics, knowledge services — research	Labs, pharma
Knowledge services — research	ITeS	✓	✓	✓		Support roles for other occupations	Learning, publishing
Supply chain management	ITeS	✓	✓			Analytics, knowledge services — research, finance and accounting	Manufacturing, retail
Engineering analysis	ER&D					Product manufacturing support	Aerospace, automobile and hardware
Product engineering design	ER&D					Product lifecycle management	Aerospace, automobile and hardware
Transition	SPD	✓	✓	✓		Integration and deployment, testing and quality assurance	IT-specific roles in any industry

Top 20 job roles by sub-sector							
Job roles/ occupation	**Sub-Sector**	**Alignment with other sectors**				**Other occupations**	**Other industry**
		ITS	**ITeS**	**SPD**	**ER&D**		
Product development and delivery	SPD	✓	✓	✓	✓	Product lifecycle management, product support, project/program management, testing and quality assurance, integration and deployment	IT-specific roles in any industry
Project/ program management	SPD	✓	✓	✓	✓	Sales and marketing/business development, product lifecycle management, product development and delivery and product packaging	All services industries
Product support	SPD		✓	✓	✓	Product development and delivery, product documentation, testing and quality assurance	Infrastructure department in all industry
Sales and marketing/ business development	SPD	✓	✓	✓	✓	Product lifecycle management, product research and design, product support	Sales and pre-sales in all industries
Testing and quality assurance	SPD		✓	✓	✓	Product lifecycle management, project/program management, sales and marketing/business development, product development and delivery, integration and deployment and product support	IT-specific roles in any industry

Source: NASSCOM; KPMG in India analysis

Application development	
Job role	**Qualification and skills**
Application/functional developer ▪ Captures data and translates and transforms it into a processing language ▪ Develops codes from relevant information, and schedules, processes and monitors them ▪ Contributes to the development of test scripts and test scenarios **Media developer** ▪ Develops visual, audio/video media content ▪ Uses software tools to develop media content for applications with smart graphics and enhanced look and feel and usability features **Web developer** ▪ Develops programming code for web-based applications/websites ▪ Uploads the site on a server and registers it with different search engines **UI developer** ▪ Designs UI applications using HTML, Javascript, XML, JSP, JAVA and CSS ▪ Designs and implements front-end business applications while working closely with application/functional developers to help generate requirements for back-end system development	**Software developers, functional developers** ▪ BCA/MCA or engineer with certification in ▪ relevant areas ▪ Problem-solving and strong analytical capability ▪ Knowledge of programming logic and SDLC is ▪ essential ▪ Functional skills such as software languages (Java, C/C++, dot net) are essential for professionals in the software/functional development domain **Media and web developers** ▪ Any graduate/diploma course with a specialist training program in media designing ▪ Undergraduate candidates are eligible if they possess relevant skills ▪ Knowledge of programming logic and SDLC is desirable ▪ Creative thinking and attention to detail are key skills for these roles **User interface (UI) developers** ▪ BCA/MCA or engineer with certification in relevant areas ▪ Graduates/diploma-holders with relevant skills are also eligible ▪ Knowledge of programming logic and SDLC is essential ▪ Strong HTML and JavaScript (AJAX, DOM, JSON) and Java skills

Application deployment	
Job role	**Qualification and skills**
▪ Gathers, analyses, and documents customer ▪ infrastructure requirements ▪ Plans the roll-out process and sequence of new ▪ systems and platforms ▪ Deploys, configures, manages and troubleshoots the software solution ▪ Provides technical support and performs quality assurance of new software updates	▪ BCA / MCA or Engineer with certification in relevant areas ▪ Experience of implementing IT projects –deployment or maintenance ▪ Knowledge and experience with SDLC and different methodologies ▪ Strong communication skills Strong HTML and JavaScript (AJAX, DOM, JSON) and Java skills

Source: NASSCOM, KPMG in India analysis

Skill requirement for select job roles

Data scientists	
Job role	**Qualification and skills**
- Designs and builds large and complex data sets - Thinks strategically about uses of data and how data use interacts with data design - Designs and implements statistical data quality procedures around new data sources - Performs data studies and data discovery around new data sources or new uses for existing data sources - Appropriately implements any software required for accessing and handling data - Visualizes and reports	- Bachelor's or master's degree in computer science, statistics or mathematics - Engineers with exposure to and/or experience in large-scale database and processes are also eligible - Proficiency in specific data analysis packages (SPSS, SAS, STATA and/or Excel) - Strong mathematics and statistics skills - Coursework or practical experience with data mining or practical experience building algorithms

Infrastructure management services	
Job role	**Qualification and skills**
- Provides diagnosis and resolution of computer hardware and software problems - Provides planning, design, implementation and technical support of computer hardware, software and network components - Develops specifications for new enhancements or systems - Maintains daily logs and tracks systems performance on a day-to-day basis - Prepares detailed management standards and procedures and enforcement of processes, including procedures for systems security and recovery	- BCA/MCA or engineer with certification in relevant areas - Graduates/diploma-holders with relevant skill set are also eligible - Certifications in the areas of networks/storage/servers is desired - Knowledge of systems management software and networking - Problem-solving and technical capability

Information security	
Job role	**Qualification and skills**
- Evaluates risks and develops approach to information security solutions - Installs, configures, monitors and responds to security system requirements - Performs daily log-keeping, status reporting, analytics on set metrics to report security SLAs - Supports administration of various firewalls and security systems - Creates, implements and maintains information security plans and systems for the organization	- BCA/MCA or engineer in computer science, information systems or related field with certification in information security-related areas - Knowledge of information security principles and practices - Experience in software and security architecture

Source: NASSCOM, KPMG in India analysis

Skill requirement for select job roles

Analytics	
Job role	**Qualification and skills**
▪ Tracks business metrics and generates dashboards for the consumption of business managers ▪ Develops research protocols, analytical frameworks and cracks tough business problems across verticals ▪ Organizes, analyzes, synthesizes and summarizes information using appropriate analytical methodologies and frameworks ▪ Applies quantitative abilities to build statistical models ▪ Explores data to find new patterns and relationships (data mining) models	▪ MBA/MTech/BTech/BE/DSE/ISI ▪ Quantitative abilities and number-crunching skills ▪ Exposure to statistical software packages such as SPSS and SAS ▪ Exposure to some modeling techniques ▪ Data presentation and reporting ability/skill

Customer relationship management	
Job role	**Qualification and skills**
Voice ▪ Receives and makes telephone calls that are primarily scripted, basic and routine with the assistance of a computerized system; non-technical query resolution done over calls, web or e-mail ▪ Answers inquiries, resolves problems, records complaints and/or receives feedback **Non-voice** ▪ Responds on either pre-existing e-mail templates or through customized e-mails. ▪ Handles complex queries/situations through chat or web interface ▪ Makes major modifications in data and adds value to it before sending it back ▪ Escalates complex queries to relevant team as per guidelines **IT services help desk** ▪ Provides application support ▪ Understands specific client or technical requirements to resolve or escalate technical problems	▪ IT services help desk — engineer/graduate in science ▪ Undergraduate/graduate/postgraduate in any subject ▪ Excellent communication skills (mostly English language, but many organizations may specialize in regional languages, such as Hindi) ▪ Basic computer proficiency ▪ Empathetic nature and the ability to handle irate customers ▪ Ability to navigate a computerized data entry system or other relevant applications ▪ Ability to handle clients and communicate with them ▪ Ability to communicate by chat/e-mail or other tools

Source: NASSCOM, KPMG in India analysis

Skill requirement for select job roles

Finance and accounting	
Job role	**Qualification and skills**
▪ Processes invoices ▪ Undertakes simple processing of financial transactions such as card payments and checks ▪ Manages dispute resolution with vendors (accounts payable) ▪ Manages business collections (accounts receivable) ▪ Works on cash application (accounts receivable) ▪ Performs simple analysis ▪ Uses simple tools, rules and methodologies	▪ Graduate/bachelor's in commerce ▪ Must possess basic knowledge of accounting ▪ Ability to accurately follow instructions or procedures required to enter or mange large data into systems/formats ▪ Proficient in Microsoft Office tools such as PowerPoint, Excel and Word

Health services	
Job role	**Qualification and skills**
Health services professional — CDM ▪ Organizes and maintains information related to medical research and records ▪ Performs data coding of records ▪ Ensures completeness, correctness and quality of data generated during clinical trials with high accuracy **Medical transcription professional** ▪ Transcription of medical records dictated by doctors and others ▪ Transcription of medical history and physical reports, clinic notes, office notes, operative reports, consultation notes, discharge summaries, letters, psychiatric evaluations, laboratory reports, x-ray reports and pathology reports	▪ BSc. in computer science or biology ▪ Understanding of dictionaries used for coding and standardization ▪ Graduate in science ▪ Certification in medical transcription ▪ Familiarity with medical terms ▪ Quick reading and writing ability ▪ Content technology skills

Legal services	
Job role	**Qualification and skills**
▪ Reviews large volumes of litigation documents ▪ Supports corporate legal departments through research ▪ Undertakes simple analysis ▪ Undertakes research that can generate revenue for the company	▪ Graduate in law ▪ Familiarity with legal terms ▪ Ability to read and write quickly

Source: NASSCOM, KPMG in India analysis

Skill requirement for select job roles

Knowledge services	
Job role	**Qualification and skills**
▪ Undertakes primary and secondary desk-based research ▪ Organizes, analyzes, synthesizes and summarizes information using appropriate analytical methodologies ▪ Prepares company profiles, financial analysis and valuations and benchmarking ▪ Analyzes consumer opinions ▪ Collects data using techniques such as questionnaires, surveys, interviews and electronic data ▪ Works on various areas of research, mostly secondary, with elements of primary research as per requirement	▪ Graduate/MBA/BBA/CA/CFA/Bcom. ▪ Exposure to qualitative and quantitative research techniques and methodologies ▪ Proficient in Microsoft Office tools such as PowerPoint, Excel and Word ▪ Good verbal and written communication skills ▪ Basic understanding of financial concepts and statements ▪ Data presentation and reporting ability/skill

Supply chain management	
Job role	**Qualification and skills**
▪ Undertakes first level of procurement activities for buyers and/or supplier support to ensure accuracy and quick turn-around time ▪ Buyer support: takes instructions from buyers ▪ Generates purchase orders ▪ Supplier support: selects reports from database and places orders based on information from buyers ▪ Follows up on dispatches ▪ Manages suppliers ▪ Manages inventories ▪ Reviews customer payment and trends	▪ Graduate/postgraduate ▪ Negotiation skills ▪ Excellent communication skills ▪ Exposure to qualitative and quantitative research techniques and methodologies ▪ Proficient in Microsoft Office tools such as PowerPoint, Excel and Word

Testing and quality assurance	
Job role	**Qualification and skills**
▪ Develops and coordinates test plans ▪ Manually checks documents, reports and tracks software defects using testing software ▪ Conducts software compatibility tests with programs, hardware, operating systems or network environments	▪ BCA/MCA or engineer with certification in relevant areas ▪ Strong communication skills — written and verbal ▪ Attention to detail and perseverance are important for ensuring testing professionals' success

Source: NASSCOM, KPMG in India analysis

Skill requirement for select job roles

Engineering analysis	
Job role	**Qualification and skills**
▪ Analyzes complex static/dynamic/thermal/fluid-flow problems using software tools in the areas of automotive, aerospace, chemical and energy ▪ Delivers accurate mechanical analysis that is incorporated in the overall design ▪ Performs flow and thermal analysis at component and system level ▪ Conducts finite element analysis of various structural parts ▪ Analyzes performance, emission data and documents and presents the results ▪ Collaborates closely with design teams to reduce the time it takes products to reach the market	▪ BE/Btech./MCA (preferably mechanical engineering) ▪ Knowledge of computational fluid dynamics (CFD) packages such as ANSYS, ABAQUS, Fluent, KIVA, GT-Power, FLOWMASTER, AMESIM, Gambit, ICEM-CFD and T-Grid

Product support	
Job role	**Qualification and skills**
▪ Provides client support and resolves technical issues through phone, email or other electronic media ▪ Maintains complaint logs accurately and escalates critical issues that require resolution from other teams ▪ Monitors, gathers information and tracks resolution of complaints ▪ Maintains and updates knowledge of products through knowledge-based articles	▪ Graduate/PGs/diploma-holders equivalent to graduates from any discipline ▪ Engineers from other non-IT-related streams such as agriculture and civil are also considered ▪ Strong verbal and written communication skills ▪ Ability to understand requirements as well as analyze and interpret technical procedures and knowledge articles to resolve customer queries

Project/program management	
Job role	**Qualification and skills**
▪ Leads planning and implementation of projects/programs ▪ Manages project budgets, timelines and resource allocation ▪ Manages implementation deadlines, quality of deliverables, communication and escalations ▪ Monitors, manages and reports on the execution of deliverables through all the phases of program/project ▪ project completion is smooth	▪ Graduate/postgraduate in any stream; preference for candidates who have BTech. and MBA degrees ▪ Experience in managing software products projects ▪ Excellent communication and presentation skills ▪ Strong leadership and stakeholder management skills

Source: NASSCOM, KPMG in India analysis

Product development and delivery	
Job role	**Qualification and skills**
- Captures data and translates and transforms it into a processing language - Develops codes from relevant information and performs the tasks required for scheduling, processing and monitoring them - Tracks all defects and provides bug fixes - Media, web and UI developers use software to develop frontend applications with smart graphics and enhanced look and feel and usability features	**Software, functional and UI developers require relatively high qualifications and skills** - BCA/MCA or engineer with certification in relevant areas - Problem-solving and strong analytical capability - Functional skills such as software languages (Java, C/C++, dot net and Perl) are essential for professionals in the software/functional development domains **Media and web developers** - Any graduate/diploma course with a specialist training program in media designing; even undergraduates are eligible if they possess relevant skills - Knowledge of programming logic and SDLC is desirable **Product developers in the identified tracks require significantly different entry-level qualifications and skills**

Product engineering design	
Job role	**Qualification and skills**
- Takes responsibility for the design, usability and aesthetics of a product - Creates and revises designs in CAD system following drawings or designs of actual products - Interfaces with the engineering and usability teams to ensure that the designs incorporate all aspects of engineering and they are tested, practical and implementable - Prepares design specifications, analysis and recommendations for presentation and approval - May get involved in specifying materials, equipment and supplies required for the completion of projects - May be responsible for the design, development and implementation of custom mechanical tooling, and associated processes to enable the handling and assembly or disassembly of parts and components throughout the product lifecycle	- BE/Btech./MCA (preferably mechanical engineering) for software design engineer - Diploma (preferably mechanical engineering) for draftsman - Proficiency in the use of tools such as CAD, CAE and CATIA - Awareness of various stages in new product development - Working knowledge of mechanical engineering design, mechanics and material science concepts and techniques - Proficiency in solving engineering problems using analytical techniques and engineering knowledge such as measurement control, stress analysis, finite element analysis or system integration - Knowledge of prototyping and testing of products - Expertise in sketch and concept development

Source: NASSCOM, KPMG in India analysis

Sales and marketing/business development	
Job role	**Qualification and skills**
- Gathers information on new/changed technical offerings from business model and strategy and technology integration and summarizes as per client requirements - Manages alliances and relationship with sales partners such as ERP product organizations - Develops demonstrations of the technical and functional capabilities of the organization to facilitate sales - Supports key accounts by conducting demonstrations and defining special agreements with clients - Provides input on client requirements to product development teams	- Postgraduate in technology/management-related areas with graduation in the field of technology - Graduates can move laterally into sales and marketing/business development after gaining experience and acquiring the requisite skill set - Good command on the English language - They should be action-oriented and go-getters

Transition	
Job role	**Qualification and skills**
- Scopes requirements and estimates efforts required for transitions - Develops and implements the transition plan - Defines roles and responsibilities of all stakeholders involved in the transition - Creates checklists and plans to handle contingencies - Manages internal and third-party stakeholders - Develops communication plans for external and internal stakeholders	- Postgraduate in technology/management-related areas with graduation in the areas of technology - Fair understanding of software engineering and development using the SDLC methodology - Excellent verbal and written communications skills

Source: NASSCOM, KPMG in India analysis

Job role and employer identification

The Indian IT-BPO sector, estimated to generate US$108 billion in revenues by 2013 (including hardware), is expected to employ three million professionals directly and nine-and-a-half million professionals indirectly. According to a NASSCOM survey, following are the top 20 employers in this sector,

S.No.	Company name	S. No.	Company name
1	Aegis Ltd	11	Tata Consultancy Services Ltd
2	iGate Global Solutions Ltd.	12	Infosys Limited
3	CSC India	13	Cognizant Technology Solutions India Pvt. Ltd
4	Firstsource Solutions Ltd.	14	Wipro Ltd
5	WNS Global Services	15	HCL Technologies Ltd.
6	Syntel Ltd	16	Tech Mahindra Ltd.
7	EXL	17	Genpact
8	L&T Infotech	18	Serco Global Services
9	Hinduja Global Solutions Ltd.	19	Cap Gemini India Pvt. Ltd.
10	Aditya Birla Minacs	20	Mphasis Ltd.

Note: The list is based on Indian full-time employment headcount. Other MNCs such as Accenture, HP, IBM and Convergys were not included, as they declined to participate in the survey. Tech Mahindra includes the employees of Mahindra Satyam. The number of employees is as available in annual reports and on company websites.

TCS, with the total employee count of more than 270,000 professionals, has more than 250,000 Indian employees. The company also added 59,276 professionals during 2013, the highest in India by an IT-BPO company, followed by Infosys with 37,036 additions in the same period.

The top 5 Indian IT-BPO companies account for nearly US$30 billion in revenue (in FY13); nearly 30 percent of the total Indian IT-BPO industry.

Training Infrastructure

Training Infrastructure
The present education system is a root cause for skill gaps in the sector

- The present education system does not have content that prepares professionals for the industry and a majority of the curriculum at the school-level has not been revised in the last two decades.

- Moreover, focus is on imparting technical skills and there is no stress on the development of interpersonal skills

- Educational institutions for higher studies are under the ambit of UGC regulations and, so, the process of re-evaluating course content becomes inflexible

- Additionally, there are not enough certification, diploma or degree programs to address the skill requirements arising due to the evolution of next-generation technologies, such as cloud computing and analytics

- There is a demand for skilled manpower at the entry level. There is a fair amount of interest in training in this sector as compared to others. However, the quality of training is not up to the mark. The industry treats skilled and unskilled people at par. IT is a mature industry and is known for its infrastructure that could not have been built without the training infrastructure. However, the industry is still reluctant to pay for skilling. A majority of companies prefer recruiting untrained students and training them as per their requirements. Even if they hire trained people, they lack the skills that the industry demands.

- While the industry serves as one of the largest employers of the country's engineers, it faces a paradox in terms of the engineers available and employed

- The sector employs a mix of civil, mechanical and electronics engineer, which restricts the skill set of the employed engineer

- Further, several IT & ITeS companies have raised concerns on the quality of engineers since they believe that the engineers graduating from various colleges lack skill sets that make them employable

- Building infrastructure in certain locations is a challenge — such as in CISCO certification, there is a need to show router to every student who can work on router to see how things work before they take CCNA or CCNP exams. There is an absence of practical training

- Mobilizing students to pursue training courses and, thereafter, getting jobs. Since several IT hubs are located in major cities such as Mumbai, Pune, Bangalore, Chennai, NCR, Kolkata and Ahmadabad, students are often reluctant to migrate due to low salaries and high cost of living in these cities

- In-housing training by companies like Wipro and TCS lead to captive talent pool being trained

Intake of students for PG courses forms a minuscule % of total intakes in engineering and technology institutions

Intake of Engineering & Technology Institutions (In Lakhs)

UG · PG · Diploma
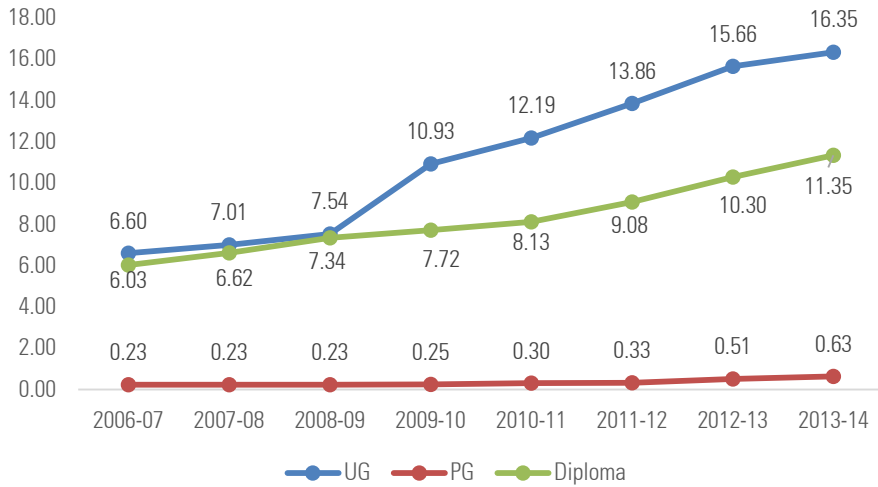
- Intake of students for PG courses forms a minuscule percentage of total number of intakes in these institutions. Contribution of intake for PG courses as % of total intake of engineering and technology institutions has marginally increased from 1.79% to 2.24%.
- CAGR of intake over the period 2006 - 2014 for UG courses, PG courses and Diploma courses is 13.84%, 15.52%, and 9.45% respectively.
- CAGR in number of institutes offering UG courses, PG courses and Diploma courses over the period 2006 – 2014 is 12.2%, 11.76% and 8.06%.

Intake Growth in Technical Institutes(lakhs)

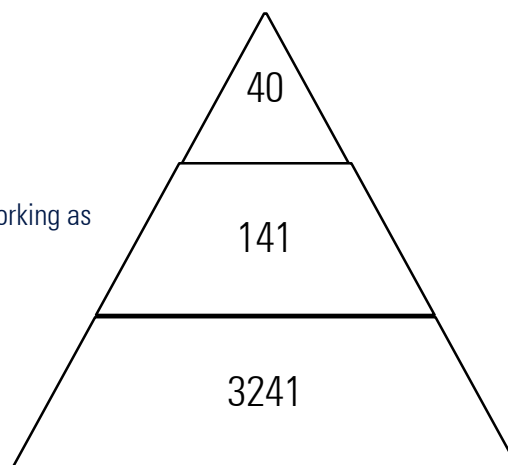■ Institutes of National Importance   ■ AICTE Approved Colleges
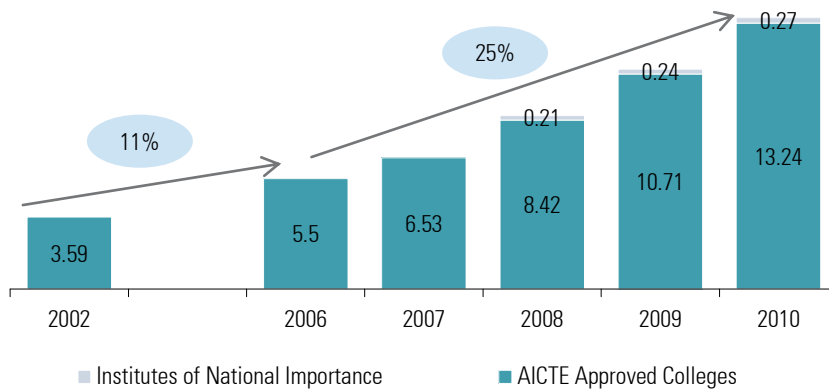
Capacity of institutes renowned for quality has not increased much compared to overall growth.

Less than 10% of Institutes constitute the top of quality pyramid in engineering education offering cutting edge education

Offer the best quality education — **40** — Institutes of National Importance (IITs-15,NITs-20,IIITs-5)

Awarded university status after working as affiliated colleges — **141** — Deemed/Private Universities (Deemed-75,Private-66)
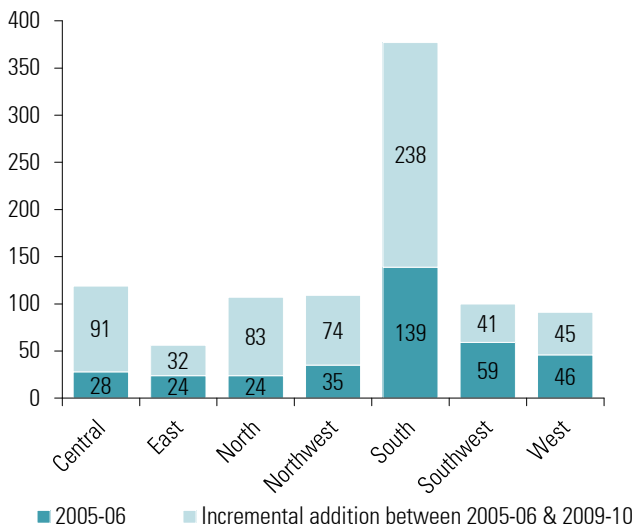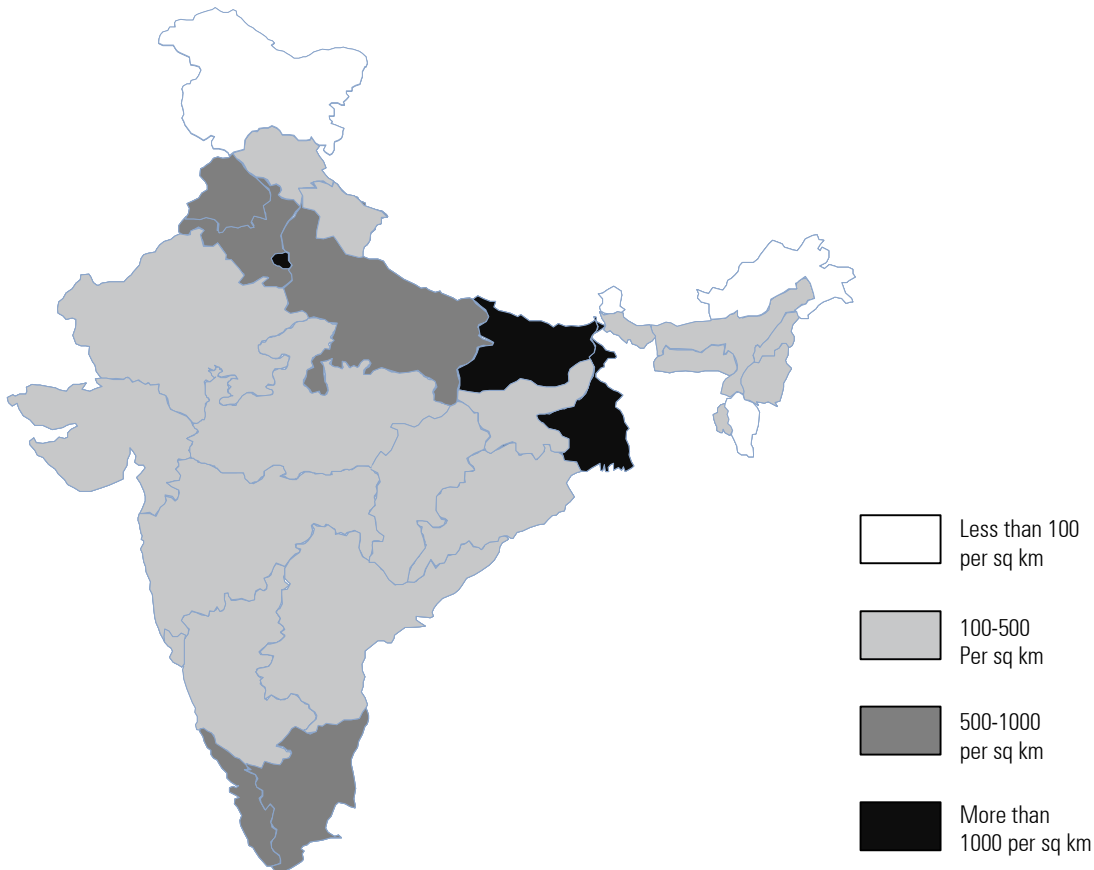
Quality varies across colleges — **3241** — AICTE Approved Engineering Colleges

Source: AICTE Statistics, KPMG in India analysis

While Southern states already have high density of engineering seats Bihar and North eastern states could become potential targets for future growth

Density of Available engineering seats across states(per million population)

Legend:
- Less than 100 per sq km
- 100-500 Per sq km
- 500-1000 per sq km
- More than 1000 per sq km

Bar chart data:

Region	2005-06	Incremental addition between 2005-06 & 2009-10
Central	28	91
East	24	32
North	24	83
Northwest	35	74
South	139	238
Southwest	59	41
West	46	45

Legend: ■ 2005-06   ■ Incremental addition between 2005-06 & 2009-10

- Southern states have witnessed largest growth in intake capacities between 2005-06 and 2009-10.

- West, South west and eastern regions have witnessed low growth in this period.

- North eastern states and Bihar have lowest engineering seat density per million population indicating potential for private players in these regions provided there is demand in this region.

- Concentration of quality Institutes is uneven with a great demand for such Institutes in Central India.

Source: AICTE Reports, MHRD Reports, Census 2011

Tata Consultancy Services

- Single largest private sector employer in the country. Employs over 2,85,000 professionals worldwide and plans to hire 50,000 professionals in 2013-14
- Spends over   15 million hours on learning and development programs of its employees
- Over the last five years till date, the company has trained over 1,43,000 IT professionals in India and abroad
- The company's learning programs include its award-winning Initial Learning Program for fresh graduate trainees as well as numerous Competency Development and Leadership Development Programs for middle and senior executives in the company.
- The company is setting up the world's largest corporate training center in Thiruvananthapuram. The center is being constructed on nearly 100 acres of land which will contain over 6 million square feet of buildings – and infrastructure. The center will have a capacity to train 50,000 IT professionals each year, and about 15,000 at any given time.

Infosys

- Employs over 1,60,000 professionals worldwide and plans to hire 50,000 professionals in 2013-14
- Infosys has nine training centers in India. The Global Education Center at Mysore is "World's Largest Corporate Training Center" with capacity to accommodate 14,000 trainees at any time.
- The Global Education Center spends Rs. 750 crore yearly on training. It invests an average of Rs. 2.50 lakh on training a potential employee over a period of 16 weeks.
- The company engages more than 500 engineering colleges nationwide to make the curriculum relevant to industry and oriented towards employment. Infosys' Campus Connect program trains the faculty on the skills to be imparted to students and integrating software engineering into the curriculum.
- Infosys Foundation, the philanthropic arm of the company has launched Spark-IT, a program to enhance the skill levels of engineering graduates in the country. Spark-IT is a three month program, to enhance both technical and communication skills of unemployed engineering graduates.

Wipro

- Employs over 1,45,000 professionals
- Provides onboarding programs, leadership development programs, industry centered cutting edge technology and domain programs
- Offers a 68 day structure training program called Project Readiness Program to all campus recruits that trains them on essential behavioral and technical skills.
- The company offers Wipro Academy of Software Excellence (WASE) and Wipro Software Technology Academy (WiSTA) program. The WASE program is a four years off- campus collaborative MS Program with the Birla Institute of Technology & Science (BITS) Pilani, Rajasthan.
- The WiSTA program is a work integrated M.S. program in Information Technology for science graduates with non-mathematics disciplines in collaboration with VIT University, Vellore, Tamil Nadu. The WiSTA – Data Scientist program is an initiative aimed at creating an industry ready cadre of Data Scientists within Wipro in the information management and analytics space.
- In both programs students receive technical and academic inputs as well as the opportunity to apply their learning in live projects.

Source: Websites of TCS, Infosys and Wipro

Formed in collaboration with Soviet Union IITB paved the way for many reforms in technical education

Established in 1958 with assistance from UNESCO and with funds contributed by the Soviet Union

IIT Bombay started an independent postgraduate program in Corrosion Science and Engineering in 1982.

The tuition fee is almost doubled in order to meet the infrastructure up gradation.

| 1958 | 1973 | 1982 | 2004 | 2008 |

Start of the Institute festivals – a new era of extra-curricular activities

Society for Innovation and Entrepreneurship (SINE) was set up in 2004.

The Intake for all the programs has been increased to accommodate OBC reservation of 27%

IITB has established itself as a go to collaboration partner by many Indian institutes for quality enhancement

History
- 1958, Powai – Bombay
- Governed by Board of Governors, chairman nominated by President

Footprint
- Only one location – No branches

Segments
- Bachelors/masters/ PhD.
- Aerospace, computer science, civil, mechanical, electrical etc. being main focus streams

Tie ups
- Student exchange programs with 12 international Universities
- Collaborated research with Siemens, BHP Hilton, Tata tele services.

IIT Bombay's location being the industrial hub of India helped industrial sponsored research in Institute

SCALE
- Total student strength = around 6000
- UG - 880/year, PG + PhD = 1250/year
- Apart from the engineering programs, it also has a Management school and school for Bio-medicine

QUALITY
- Computer classrooms and department specific research space, state of the art labs, electronic central library, computer
- Research grants – INR 60 crores + sponsored & Industrial research projects
- Average Salary for the UG students – INR 8 lakhs per annum

Critical Success Factors

Student Acquisition
- Admission through IIT-JEE (national level) – minimizes acquisition cost
- Involving students in consultancy &other R&D projects, utilization of special centers & providing innovations for society

Partnerships
- Partnerships with content providers, foreign universities for student exchange programs
- Partnerships with corporate for sponsored& industrial research

Infrastructure
- Excellent academic and R&D facilities with focus on technology innovation
- National testing facilities & Intellectual property rights innovation

Research and Focus
- Main focus on technology transfer by growth & innovation of technologies
- Effective use industry interactions, key R&D facilities

Source: IIT Bombay Website, KPMG in India analysis

- India's 2nd largest technology, Infosys puts lot of emphasis on education and training to groom its employees
- It has significantly invested in the education industry related capability development and research.
- Infosys operates educational institutions at multiple levels within the company for training its employees

Infosys' Education Institutions

Campus Connect

- Campus Connect (Industry-Institute Initiative)

- Initiated in May 2004 in partnership with 60 colleges in India
- It is a forum where some of the best practices at Infosys are shared with educational institutions
- Needs of colleges, faculty and students, are aligned with those of the IT industry.
- Trains graduates in computer science and software engineering, and helps to apply learning to practical situations
- Special emphasis is on teamwork, project management, cross functional networking and effective communication.

Education and Research

- E&R offers training in all its development centers in India to about 30,000 new joiners every year.
- Conducts technical and project management related education programs for both in-house and strategic customers of Infosys.
- Some of the programs are:
- **E-learning**
- **Foundation Program**: Freshers undergo a 12-14 weeks full-time training program before induction into production.
- **Just-in-Time (JIT)** courses are offered to employees based on sudden/unforeseen events to meet the urgent requests of clients.
- **Knowledge Management group** is the hub of all knowledge sharing activities in Infosys.
- **Certifications** -Strong internal certification framework for all employees, which includes technical/ business certifications.

InStep - Infosys Global Internship Program

- InStep is Infosys' global internship program to attract students from the best academic institutions around the world
- It includes premier institutes such as Harvard, MIT, Oxford, Princeton and Tsinghua.
- Allows students to work on live, organizationally relevant technical and business projects in the company.
- In 2008, it received ~7,000 applications of which 125 interns were chosen

Infosys Leadership Institute

- ILI is a blend of leadership and managerial development
- Role based training programs and a global business school for in house development of employees ' managerial and interpersonal skills
- Global Business Finishing School
- This initiative focuses on preparing every fresh entrant to ready for the job in quick time.
- It runs either as a short cycle program, (6 weeks for trainees from IT backgrounds) or as a long cycle program, (14 weeks for trainees from non-IT backgrounds)
- Role Based Training Programs

1, Regulatory environment	▪ Regulatory structure is antiquated with multiple bodies and overlapping functions ▪ To prevent commercialization, profit-making is not allowed in education ▪ Restrictions on curriculum, fee, intake, course delivery
2, Lack of funding	▪ Lack diversified revenue streams – entirely skewed towards tuition fees ▪ Regulations restrict educational institutions from charging market-based fees ▪ No routes available to raise funds ▪ Public spending on higher education is minimal compared with other countries
3, Shortage of faculty	▪ Pupil-teacher ratio of 23 (world average of 15) signifies severe shortage of teachers ▪ Low number of students opting to qualify as teacher / faculty roles ▪ Overly academic, Indian teachers lack adequate industry exposure ▪ Teaching is not a chosen profession at the higher education level
4, Dated courses curriculum	▪ Curricula for traditional industries is outdated and that for emerging industries is undeveloped ▪ Lack of interaction with industry restricts innovation in the curricula/pedagogy
5, Ineffective accreditation systems	▪ Accreditation system not creating enabling environment for improving quality of institutions ▪ Grading mechanism emphasis more on physical infrastructure than on intellectual strengths
6, Governance	▪ Lack of professional management in Indian higher education institutions ▪ Most institutions not disclosing mandatory information depriving students from taking informed decisions
7, Regional disparity	▪ States favouring greater private participation have built a much robust HE system ▪ Higher education is much more accessible in urban India than in rural India

Recommendations for Key Stakeholders

Better industry academia partnerships

- Engineering graduates who join the IT and ITeS sector lack basic knowledge and skills of information technology, programming etc.
- Companies invest significant time and effort to equip fresh graduates with necessary skill set. The existing curricula do not impart the skills that can make students employable.
- The technical nature of job(s) requires practical/on-the-job training.

Recommendation 1: Industry should collaborate with colleges to set up research labs in the college campus. This provides a win-win situation to both the company and the college as this creates access for students to high quality research facility and companies reap on the benefits of the research undertaken by students.

- Summer internships should be made an integral part of the curriculum.
- Colleges should reach to more and more industry experts to have them as guest faculty. This would help students develop an understanding of the actual work in the industry and also better understand the link between curriculum taught in classroom and work in the industry.
- Industry needs to encourage continuing education programs for their employees in collaboration with leading universities and colleges. For eg. Wipro leverages expertise of BIT Pliani, Rajasthan for its continuing education programs

Capacity building in regions with low density of training infrastructure

- While Southern states already have high density of engineering seats Bihar and North eastern states could become potential targets for future growth

Recommendation 2: Government should set up technical institutes in regions with low density of engineering colleges

- State governments of states with low density of engineering colleges should provide incentives to private players to set up technical institutes in their states

Focus on improving the quality of faculty and also on increasing the faculty strength

- Currently there is an acute shortage of quality faculty in the country. Focus needs to be paid on improving the quality of research and also the number of students who opt for research.

Recommendation 3: Increased focus on up-scaling programs would help improve the quality of faculty

- Colleges and universities should focus on improving the research infrastructure. Well funded Ph.D programs with opportunities for international exposure should be rolled out to attract students who currently look to pursue Ph.D outside the country
- More institutes which provide trainer certification programs should be set up via PPP model

Focus on soft skill training

- Soft skill is one of the most important skill required in the IT and ITeS sector as large part of the work also requires interaction with the client and other members.

Recommendation 4: Colleges and training institutes should focus on developing good communication skills amongst the students pursuing education in IT and ITeS related fields.

Encourage institutes to offer cross-sectoral degrees

- Institutes should be encouraged to offer cross-sector degrees. This would ensure students don't learn just their respective subjects but also understand the practical overlap of different subjects.

Recommendation 5: Institutes should offer IT modules across other streams of engineering

- IT modules should be embedded in the curriculum of other specializations.

Rationalization of targets allotted to current partners

- Though the numbers proposed by NSDC partners cross the target numbers set by NSDC, yet NSDC should budget for additional capacity after careful rationalization of targets allotted to existing partners.

Recommendation 6: Make provision for additional capacity because existing partners might not be able to meet the targetsallotted to them

- Create additional capacities in select identified courses/geographies.

Reforming the regulatory framework

- The present regulatory system in higher education does not encourage the set up of new universities. The barriers to entry and getting accreditation is very high.

Recommendation 7: An independent regulatory authority should be set up by the government. This agency would be responsible for setting the criteria for entry, granting permissions for entry to higher education institutes, according degree granting power, monitoring standards and settling disputes, licensing accreditation agencies.

- Government should increase the financing for higher education
- Government should float education bonds and elite institutes must be encouraged to raise funds by themselves

Making certification by SSC more acceptable

- The industry does not value training. This is because of the varying quality of training provided. This ensures neither standard job role nor pay for trained students

Recommendation 8:Map up-scaling training to SSC certification

- There should be a mandate given to the industry to hire only trained or certified manpower

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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