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Country Paper -India

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A. Introduction

India has taken several initiatives over the past few years which have demonstrated the potential of ICT towards achieving Millennium Developmental Goals such as poverty alleviation, increased access to education and health services and reduced gender inequalities.

Government of India has taken effective measures for spread of telecommunications to every nook and corner of the country and for wide spread use of Information technology for economic and social development. Today Information and communication technologies are widely used in all sectors of economic growth including agriculture, healthcare services, education, tourism, transport, infrastructure and industrial production.

B. Telecommunications

The development of world class telecommunications infrastructure is the key to rapid economic growth and to bring social change of the country. India's telecommunication sector has undergone a major process of transformation through significant policy reforms particularly with the announcement of NTP 1994 and subsequently NTP 1999. The policy changes were in terms of ownership, service and regulation of telecommunications infrastructure. Jointly ventures between government and private sector, foreign investment and private ownership were allowed over liberalized policies. India has achieved phenomenal growth during the last few years and is poised to continue high growth rates in the future also. Such rapid growth in the communication sector has become necessary for further modernization of Indian economy through rapid development of IT. The position of telephones in India is as below:

Telephone Subscribers (both Cell phone landline): 363m (Oct 2008), 142m (March 2006), 53m (March 2003); Broadband connection: 5.05 m (Oct 2008), 3.02m(Dec 2007), 0.18m (March 2005), 20m (2010 targeted); Internet subscribers : 10 million (2007), 40m(2010 targeted)

The tariffs for mobile phones usage in India is presently less than 2c and is one of the lowest globally. The mobile phones have penetrated all cross sections of society from CEOs of top business firms to farm labourers and vegetable vendors. In spite of the vast growth, the penetration of telephone in rural areas is relatively low. The teledensity in rural areas is 11% as compared to that of 74% in urban areas. The private mobile networks are available mainly in urban and semi-urban areas. Government has taken steps to provide rural telephone which include WLL connections apart from landlines, Village Public Telephones, Privately operated Public Call Offices, Mobile Gramin Sanchar Sewak Scheme (GSS) etc.

The communication revolution is India was heavily contributed by private sector participation and public-private partnerships enabled by policy changes. The Private sector is active mainly in mobile phone segment and have achieved a growth rate of 66% as compared to 17% by government sector during 2007. Foreign direct Investment played a major role for investments and to bring competitiveness. The fast growth in communications requires generation of managerial and technological expertise and advanced policy. To meet this requirements, measures have been taken to establish the concept of Telecom centres of Excellence (TCORE) on Public-Private Partnership (PPP) mode at premier academic institutes. It has

also been decided to set up an telecom Testing and Security Certification Centre (TETC) for Communication Security and Research and Monitoring. For sustained growth of telecommunications, adequate and quality trained human resources are required.

Universal Service Obligation Fund (USOF) scheme has been established with the fundamental objective of providing access to basic communications services to people in rural and remote areas at affordable and reasonable prices. A scheme has been devised to provide subsidy for setting up and managing 7871 infrastructure sites (towers) in the 500 districts spread over 27 States for provision of mobile services in specified rural and remote areas where there was no existing fixed or wireless coverage.

Recognizing the potential of broadband, it has been planned to provide broadband in all secondary and higher secondary schools, primary Health Care Centers and Gram Panchayats.

C. Health and Family Welfare

The 11th five year plan of the country aims to provide good healthcare to people specially the poor and underprivileged in an comprehensive approach including individual health care, public health, sanitation, clean drinking water, access to food, knowledge of hygiene, and feeding practices. The Plan was to facilitate convergence and development of public health systems and services. The specific objectives were Reducing Maternal Mortality Ratio (MMR) to 1 per 1000 live births; Reducing Infant Mortality Rate (IMR) to 28 per 1000 live births; Reducing Total Fertility Rate (TFR) to 2.1; Providing clean drinking water for all by 2009; Reducing malnutrition among children of age group 0–3 to half its present level; Reducing anaemia among women and girls by 50% ; Raising the sex ratio for age group 0–6 to 935 by 2011–12.

ICT initiatives planned were a national grid accessible to all stake holders; training, education, and capacity building for e-Health; Monitoring by e-enabled HMIS to ensure timely flow of data and collation to be used at various levels; Geographical Information System (GIS) Resource Mapping of various health facilities (Allopathic and AYUSH), Laboratories, Training Centres, Health Manpower, and other inputs to optimize utilization; Providing service delivery and other e-enabled activities like, disease surveillance, tele-consultations, health helpline, district hospital referral net, and e-enabled mobile medical units**.**

D. Information Technology: Growth and organizations

The Indian IT and electronics industry is growing at the rate of over 33% and the its production in the year 2007-28 was about US64$ out of which over US$ 40 billion was on exports of software and software services. Underlying the sustained export growth is a combination of large demand potential, rapidly growing adoption and widening scope of the global delivery model and India continuing to leverage its fundamental advantages of talent, cost, quality and early mover advantage/experience to garner a large share of the growth in global sourcing of IT. The number of IT- ITES, BPO professionals employed in India during 2007-08 was about 2 million.

Apart from the export and BPO markets, India has huge potential of domestic ICT market. Its penetration in the domestic market presently is limited and its full potential is yet to be tapped for improved domestic consumption, economic and social development and for better governance.

Department of Information Technology, Government of India has undertaken many programs for ICT lead economic and social development. These include National e-Governance Program (NeGP); Cyber Security; Indian Computer Emergency Response Team (CERT-In); IT Act; Internationalized domain names; establishment of QOS Network Test Bed; Electronics hardware Industry Promotion; Technology and application development in various aspects of Information Technology including ICT for common man, convergence of Communications and broadband technologies, Industrial electronics development & promotion, Innovation and Intellectual Property Rights Promotion, Technology Incubation Promotion, Free Open Source Software, Technology Development in Indian Languages(TDIL), telemedicine,

electronic components and materials, Microelectronics and Nanotechnology, photonics, ecommerce and digital library etc. Human resource development in various aspects of ICT is taken up by the Department. Many of the programs of the DIT are implemented through its attached offices and autonomous organizations which include:

- National Informatics Centre: Nodal S&T organization providing network backbone and e-Governance support to the Central and State Governments
- Centre for Development of Advanced Computing (CDAC): Supercomputers, Technology and Skill development in ICT.
- STQC: Standardization, testing and quality Control in Electronics and IT
- Software Technology Parks of India (STPI): Manage and provide infrastructure facilities for software industry, and provide services like technology assessment and professional tranining
- SAMEER: Technology development on Microwaves and allied disciplines
- Media Lab Asia: ICT technology development for common man and rural areas
- DOEACC: Human Resource Development in the area of Information and Communication Technology
- ERNET India: Network and connectivity to educational and research organizations and provide access to digital libraries and scientific journals across the country.
- C-MET: Development of technologies in the area of electronic materials

E. e-Governance

Government of India has taken up an aggressive National e-Governance Plan. The objective of the e-Governance in broader terms is to make all Government services accessible to the common man at her/his location. The emphasis is to ensure a) integrated & enhanced access to government services, clearly defined services, services at the doorstep with substantial rural outreach, increased efficiency, enhanced transparency, improved reliability and affordable cost. This National e-Governance Plan (NeGP) is being implemented by creating the common core infrastructure which include National/State Wide Area Networks, National/State Data Centres, Common Services Centres (CSCs) & and Electronic Service Delivery Gateways. 100, 000 CSCs will be enabled with broadband internet for offering various government and private services to the people. The NeGP programme has Capacity Building scheme for creation of internal capacity by the States, strengthening State training institutions, curriculum and content development, knowledge management and sharing. The programs include land records computerization, computerization of transport system, India portal, standards in e-Governance, e-readiness, awareness and communication, Unique ID etc. and pilot projects on e-District where the backend workflows in a district are computerized with appropriate Business Process Re-engineering for offering various services online to the people in the district including application to RTI Act, ration cards, police complaint, issue of birth/death certificates, copies of the land records, application to the housing sites etc.

F. Human Resource Development -Higher Education

The Ministry of Human Resource Development (MHRD) has the over arching role for enabling the formal education in India. The Indian higher education system was one of the largest in the world. By the end of 10^{th} five year plan (2006-07), India has 378 universities, 18064 colleges with a faculty strength of 0.492 million and a student enrolment of 14 million, out of which 0.5 million were technical graduates. There were 23 central universities, 216 state universities, 110 deemed universities, 11 private universities and 33 institutions of national importance and 5 institutions established by States. There were 7 IITs, 6 IIMs, 1617 engineering and technology colleges, 525 institutions for diploma in pharmacy, 4 institutions of Architecture. There were 12 IIITs and 20 national Institutes of Technology (NITs). For post-graduate colleges, there were 1147 eduational institutions for MBA/PGDM and 953 for MCA. During 2007-08, the annual turn out of engineering degree -258,800; engineering diploma -133,600; science graduates -437,000; MCA -47,000; post graduate in Engg -14,800; post graduate in science -32,000.

Recognizing the growing demand for quality human resources, 12 IIITs which have been setup by Government, private and under public –private partnership to generate human resources exclusively in ICT area. Setting up 8 new IITs, 7 new IIMs, 12 new Central universities and another 20 IIIT through public-private participation has been announced by the Government. The NASSCOM (National Association of Software and Services Companies) has prepared a model Detailed Project Report (DPR) for setting up of these 20 IIITs where they proposed these institutions may be set up as fully autonomous institutions under Public-Private Partnership by the Central Government, respective State Governments and Industry partners. It was recommended that these IIITs would address the changing needs of industry in terms of filling the skill gap by upgrading curriculum and also collaborate with Industry for engaging in pre-competitive research and development in the frontier areas of ICTs.

Specific steps have been taken for leveraging ICTs in the education system. The UGC INFONET, eJournal Consortia and e-content development programmes have been operationalized with access to 4400 e-Journals and 100 universities have been covered under the UGC INFONET. UGC INFONET is a vehicle for distance learning to facilitate spread of quality education all over the country. The Ph.D theses will be available in the digital content form and an electronic catalogue of university library books, and non book material will be accessible across all universities. The bibliography will be available not only in English and also in French, German, Russian etc. apart from the Indian Languages. The plans during the 11th Five year Plan include - Provision for access to global resources including multimedia based education content through networking of Colleges and Universities and provision for a platform for collaboration among teachers and students using communication networks, audio and video conferencing system at Universities, manpower training etc.

G. ICT Human Resource Development – Capacity Building

Department of Information Technology, Government of India has initiated various programs for imparting IT education, specialized IT courses, developing tools and technologies for producing quality ICT human resources, development of weaker sections of the society and Gender empowerment and empowerment of disabled through ICT. The specialized programs include e-learning, Information security, VLSI design, manpower development for software export. etc.

The DOEACC society, an autonomous organization of the DIT set up to carry out HRD activities in ICT has 10 centers in the country and also is an examination body which accredits institutes/organizations for conducting courses particularly in the non-formal sector of IT education and training. The DOEACC offers courses at the levels of O (introductory) , A, B, C (advanced) in ICT and upto March 2008, about 0.64 million candidates have registered and 0.125 million candidates have qualified in these courses. DOEACC also offers short term courses in the areas of Information Technology, Electronics Design & Technology, manufacturing Technology and Maintenance Engineering and about 40,000 candidates are tranined every year through these short courses. DOEACC is also implementing training programs for women at much reduced fee on O/A/B/C level courses, ICT awareness and entrepreneurship, ITES –BPO training etc. There is also a scholarship scheme for women, disabled and scheduled caste and scheduled tribe candidates for pursuing the courses. A project has also taken up for training of the trainers.

The Department has taken up a Special Manpower Development Program (SMDP) in the area of VLSI design and related software with 7 resource centres and 25 participating Institutions. About 3000 persons per year at various levels (B.Tech, M.Tech and Ph.D) are trained through this program. The INUP (Indian Nanotechnology User Program) initiated aims to facilitate and support the generation of expertise and knowledge in nanoelectronics through participation and utilization of the facilities established at the Centers of Excellence in Nanoelectronics at IISc and IIT-Bombay by external users. The Department has also initiated several R&D projects in the area of nanoelectronics in the country which is expected to create a base for generation of quality human resources apart from producing technologies in this advanced technological area.

The department is supporting projects for development of e-learning tools, training of teachers in e-learning and toolsfor design and delivery of e-content, content development independent of platform and environment (open source), setting up of the quality assurance framework in e-learning etc.

CDAC is offering various ICT education and training programs at its various centers in the areas of VLSI, embedded systems, Information Technology, internet technologies, bioinformatics, multimedia, enterprise system management, database administration etc. These courses include M.Tech, MCA, diploma and certificate programmes. CDAC also setup state-of-the-art training centres in IT abroad including Ghana, Uzbekistan, Tazekistan and Mauritius.

Media Lab Asia has been developing ICT applications for grass-root development which include ICT for education, ICT for livelihood generation and enhancement, ICT for healthcare, ICT for disabled and broadband connectivity. It has worked on about 75 projects in these fields, developed technologies, products and models and field tested some of them in collaboration with NGOs and other field level organizations. The project *Chetana* aimed to build enabling ICT platforms for empowering women and children in rural communities using community TV and Community radio. It is planned to train rural people to make them develop their own community TV and radio content. In the project *Ashwini,* a broadband wireless network has been established in a rural area for providing integrated services including quality education to school children, training of women in textile design, providing telemedicine and agricultural advice to the farmers. Rural BPOs have been set up at these centres where village youth are trained in ICT and provided employment at these centres. Media Lab Asia in partnership with Rehabilitation Council of India (RCI) have created a National Interactive disability portal where online courses run by RCI are available. A satellite & internet based national network for education, training and empowerment of the disabled has been started. Projects have been taken up for ICT in classrooms in rural schools, content authoring tool, life skill training tools for nomadic tribes, application of ICT in vocational education and training. Technology development on ICT based health informatics and telemedicine, personalized and integrated agricultural services including capacity building have been taken up.

India is multilingual country with 22 official languages and 10 scripts. It is therefore essential that ICT tools for information processing in local languages are developed. Software tools and fonts for 10 Indian languages namely Hindi, Tamil, Telugu, Assamese, Kannada, Malayalam, Marathi, Oriya, Punjabi and Urdu have released developed and released in public domain. The focus of the language tools include translation systems, cross lingual information access, linguistic resources, human machine interface systems, localization and content creation, and standardization.

I. ICT Human Resource Development: Associations and NGOs

The quality of education is one of the concerns. The NASSCOM –McKinsey Report indicates that while more than 3 million graduate students and 500,000 engineers are produced every year, only 25% of the engineering graduates are employable in IT-BPO jobs, only 15%of the commerce graduates are suitable for employment in BPO finance and accounting work, and only 10% of the generalist graduates are suitable for other BPO work. Much of the BPO work is of a routine nature, but increasingly the outsourced jobs are getting sophisticated and industry estimate is that in 2007 the share of Knowledge Services a was 15% which include animation and simulation services, data research and analytics and litigation services, intellectual property research, medical content and services, pharmaceutical services, content development services, database development services etc. The big impediment in India making progress from data processing and customer contact services to knowledge process is deficiency in qualified talent in both quantitative and qualitative terms in economics and statistics, law, medical science, pharmacy, media, and English language.

NASSCOM has taken several initiatives for quality education in India. There include IT Workforce development Initiative where in various industry –academia meets are organized which provided an opportunity for students getting mentored by Industry and to work closely on industry projects ; MOUs

with AICTE and UGC to strengthen professional education; National Skills Registry for IT professional (NSR-ITP); Certification Program for Building frontline Managers of ITES-BPO sector; and NASSCOM Assessment of Competence (NAC).

The NAC initiative is aimed at creating a robust and continuous pipeline of talent. This is done by continuously assessing candidates on key skills through a national standard assessment, thus making it easier for firms to screen candidates and also provide training need analysis to candidates**.** This program will test the aptitude of a candidate on 7 different skill sets including listening and keyboard skills, verbal ability, spoken English, comprehension and writing ability, office software usage, numerical & analytical skills and concentration and accuracy.

A number of NGOs are working at the grass root level to bring the advantages of the ICTs to the rural people and train them in use of the technologies for their economic, and social betterment. The NGOs include MSSRF, Byrraju Foundation, Drishti, BAIF India, Datamation Foundation, Premji Foundation, Digital Empowerment Foundation etc.