S&T Manpower Study
Executive Summary (ICT Sector)

Preamble

Ministry of Science and Technology have sanctioned a detailed study of S&T Manpower, to be undertaken by the INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING, HYDERABAD, under authorization letter No.DST/NSTMIS/05/54/2004 dated 31st March 2004. The study in a 9 month time frame is to cover 2 emerging areas, namely (i) Information & Communication Technology and (ii) Bio Technology

Objective

The objective of the study is to examine the requirements and supply of technical manpower in a long term perspective, identifying existing and emerging gaps in supply and demand and to address the educational and manpower development planning for the future. The essential purpose is to help plan manpower in a manner that availability of Technical Manpower by Educational Qualifications and Technical skills match the demand for such manpower.

The work on the project commenced during May, 2004.

2.0 Methodology of Study.

The Methodology of study covers the following Steps.

- ❖ Exhaustive Literature Survey covering Global and Domestic ICT Market and Manpower Study.

- ❖ Obtaining data and Information from ICT Service Providers and User Organizations through questionnaire survey.

- ❖ Personal Interaction with Major Government Departments, Large Public Sector Organizations to get relevant details on their ICT spending and the manpower requirements.

- ❖ Meeting a large number of Experts and Senior Professionals from Government, Industry and Research Organizations, and Academic Institutes (More than 70 experts were met personally)

- ❖ Personal visits to Organizations for getting relevant details on ICT manpower scenario (Nearly 200 organizations were visited)

- ❖ A Delphi Questionnaire was used to seek experts opinion and inputs on ICT scenario and the manpower requirements.

- ❖ Three Round Table Conferences were conducted at New Delhi., Bangalore, and Hyderabad involving experts from Government, Industry , Research Organizations and Academic Institutes.

- ❖ A model was developed and used to forecast the revenues and the manpower requirements for ICT sector for the year 2008, 2010 and 2012.

Based on the above steps the findings of the study and the Recommendations are presented.

3.0 Research Team

The Research Project was handled by Prof A.S. Sastry as the Principal Investigator supported by the team comprising of

Dr. Ashok Agarwal   Shri R. Sampat
Dr. N.C. Birla   Maj. Gen. Swaminathan
Shri P.K. Sastry   Shri C.P. Gupta
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4.0 Findings of the Study.

* Global IT / ITeS markets are expected to grow with a CAGR of 7 percent during 2004-2008 and are expected a CAGR of 11 percent for the period 2003-2012.

* The Global IT / ITeS market will grow to US $ 2947 billion by 2008-09 and US $ 3391 billion by 2012.

* The Indian IT / ITeS sector is expected to achieve a revenue turnover of US $ 62 billion by 2008-09 and US $ 148 billion by 2012 achieving a CAGR of 35 percent over the period 2003 -2012.

* The Indian IT / ITeS market share is expected to be around 2.5 percent during 2008-09 and 4.4 percent by 2012.

* The total value of outsourcing of services is expected to increase to US $ 48 billion by the year 2008 accounting for over 50 percent of the worldwide off-shore markets.

* Market potential for knowledge process outsourcing is expected to increase to US $ 15.5 billion registering a CAGR of 43.5 percent for the period 2003-2010.

* The ITeS revenue projections based on the model developed are US $ 62.4 billion for 2008 and US $ 139.21 billion for the year 2012.

* The ICT revenue projections based on the analysis of secondary data are US $ 62 billion for the year 2008 and US $ 148 billion for the year 2012.

* The year 2004 marked a turning point in the history of Global trade in services with growing acceptance of a global delivery model for IT / ITeS Sector.

* In the domestic market banking and financial services continue to be the dominant segments for the use of IT.

* IT spending by the Government Sector is expected to grow considerably in the coming years.

- In Telecom sector the demand for total bandwidth is projected at 90.8 Gbps for the year 2008-09 registering a CAGR of 49 percent for the period 2002-09.

- The internet bandwidth demand is projected at 61.16 Gbps for the year 2009.

- An analysis by the CII National Broadband Economic Committee indicated that broadband is expected to increase labor productivity and is expected to launch new business lines and increase and also is expected to increase efficiencies in existing businesses leading to a direct employment of 1.8 million and total employment of 62 million by 2020.

- The total number of IT / ITeS professionals in India is estimated to exceed 1.1 million by 2007 -08 and the demand will be marginally higher than the supply.

- KPMG study and Task Force report indicate that by 2012 ITeS / IT could provide direct employment to approximately 5.1 million of which nearly 3.7 million will be for IT sector exports and ITeS. Additionally another 1 to 1.5 million could be employed in the domestic / captive IT services area.

- By 2012 compared to a workforce of 3.7 million for IT exports / ITeS there would be a requirement of approximately 0.85 million managerial staff with over 5-6 years experience.

- By 2008 the hardware sector is expected to provide direct employment to 1.6 million and indirect employment to 1.1 million.

- By 2009 there could be a shortfall of 0.5 million personnel accounting for roughly 23 percent of the Industries requirement of 2.1 million people.

- India produces approximately 2.5 million graduates every year in 272 Universities and nearly 14,000 colleges. However only 7 percent of the Graduates coming out of the institutes annually are opting to work in IT/ ITeS Sector.

- It is estimated that 2.5 lakh Graduates will pass out in Engineering during the year 2006 and only about 1.4 lakh will be absorbed and others remain unemployed. Maximum absorption as well as unemployment shall be in Information Technology and Computer disciplines

- There is a large shortfall of Ph.D's in the country which is projected to be around 30,000 by the year 2010 impacting the educational institutions and R&D.

- The ICT manpower projected requirements based on the model developed are 2.68 million for the year 2008 and 6 million for the year 2012.

5.0 Recommendations of the study

1. The revenue projections for ICT sector for the year 2008 will be US $ 60-70 billion and for the year 2012 will be US $ 140-150 billion.

2. To achieve the revenue projections of ICT for 2008 and 2012 the projected manpower requirement will be 2.0 -2.5 million for the year 2008-09 and will be 5-6 million for the year 2012.

3. The ICT manpower planning in terms of supply of quality manpower need to be based on the above projections.

4. India has all along been laying stress on software development and has not given the due importance to hardware sector. The Indian hardware sector has excellent potential for employment generation at all levels, besides contributing to the competitive advantage of the IT sector. Appropriate actions need to be initiated to strengthen the hardware sector.

5. Hardware sector has the potential to generate employment from technician level to higher levels and the strengthening of the sector will have an impact on employment and economy.

6. Software development should also lead new product development.

7. The explosive growth of educational institutions imparting Engineering Degrees and MCA's need to be regulate to minimize unemployment in ICT qualified persons.

8. The curriculum in Engineering Colleges as well as other Institutions offering MCA / MBA need to be thoroughly overhauled to ensure that the knowledge and skills coming out of the Institutes meet the changing requirements of ICT sector.

9. Educational Institutions should frequently update their curriculum to meet the requirements of industry particularly in terms of emerging areas of business in Global and Domestic Markets.

10. The Academic Institutes should focus on quality of the student coming out, which has been hither to been ignored or overlooked.

11. Providing Quality Manpower depends upon the availability of quality faculty and unfortunately in the present situation the lack of adequate number of quality faculty is impacting the manpower coming out of the Institutes.

12. Appropriate steps need to be initiated to increase the availability of adequate number of qualified faculty to support the growing needs of the educational institutions.

13. The number of persons opting for Post Graduate Education in Engineering and Enrollment of students for Ph.D. is far from satisfactory. Steps need to be initiated at all levels to see that the enrollment of students at Post Graduation Level as well as at Ph.D. level is significantly increased in Engineering, particularly in the area of Computers and Information technology to ensure that Indian ICT Sector will be competitive in the Global Markets.

14. The Growth of ICT specially in the context of Global Markets is contingent upon attracting professionals (Ph.D.s and M.Techs) to R&D in Industry. Again, a lot of

effort is needed to ensure that adequate well qualified manpower is available for R&D to tap the emerging areas of business.

15. The Industry - Academic Institute interface need to be strengthened at all levels in a holistic manner to ensure that the ICT manpower coming out of the Institutes meet the requirements of the industry.

16. To ensure quality of the manpower for ICT appropriate steps need to be taken to provide a system for certification. The certification should be not only at the entry stage but should be periodic in the life cycle of the employee to ensure that the ICT personnel are updating their knowledge and skills to meet the changing requirements.

17. Education provides the foundation and a broad knowledge base. In case of ICT while the knowledge base is to be strong there is a need to realize that the skill requirements for the manpower continuously change. This implies that training efforts are to be given importance by the organizations in improving the skills on a continuous basis.

18. ICT Sector is knowledge driven requiring a strong R&D base. Organizations must focus on strengthening R&D in the organizations by providing adequate Budgets and well qualified manpower.

19. The educational system should be oriented to supply highly qualified manpower (Post Graduates and Ph.D's) for meeting manpower requirements in areas like VLSI, Embedded Systems, Nanotechnology and others.

20. Appropriate steps need to be indicated to increase enrollment of students in mathematics, and sciences to improve the Engineering education and for promoting R&D.

21. While working on this project the research team noticed that there is not much effort going on in the organizations in having a manpower plan and this is impacting the ICT sector in terms of getting quality manpower. When quality manpower is in short supply organizations face undue demands on salaries and also high levels of attrition of employees.

22. Appropriate steps need to be taken to encourage organizations at the macro and micro levels to undertake manpower planning exercises to project the manpower requirements with the needed skills and quality. One should appreciate that it would not be possible to get quality manpower instantaneously by merely paying high salaries. Producing quality manpower requires its own lead time which is significant.

23. In this context the manpower plans prepared can provide an appropriate basis for Ministry of HRD, UGC, AICTE and other bodies for orienting the Educational System to ensure that the system provides the right kind of manpower to the industry without resulting in any kind of a mismatch.

24. There is dearth of reliable statistics of existing manpower, particularly in the ICT sector. NASSCOM may be requested to indicate the sampling methodology etc. they are using for projecting manpower.

25. There should be private initiative to enter into MOU with the Department of Statistics to make data on employment ICT and telecom sector publicly available. This can be procured through surveys of the NSSO.

26. Different types of activities relating to ICT may be segregated and methodology be evolved to estimate manpower requirements for each type of activity through sample surveys; for instance, within a software firm, a programmer may be distinguished from a system integrator. When one person combined more that one activity, time devoted to each may be taken as a criterion to classify the worker.

27. Because of high rate of manpower turnover and churning, estimating stable manpower would pose a problem and a methodology need to be evolved-again NSSO has the necessary survey design to tackle the problem.

28. Government spending in computer and ICT, both at the center and state will be an important determinant of the manpower requirements. Private sector demand will grow only for high end services.

6.0 Limitations of the Study

1. The ICT Sector is quite complex and highly dynamic in nature and the findings of the study at any point of time are to be viewed in this context.

2. Indian ICT Sector Performance and Growth are driven more by Global forces which include global economy, technology changes, social and political developments which are difficult to assess and predict their impact.

3. The Global economies are fluctuating widely and these will impact the future projections of Global as well as Indian ICT markets. For example the impact of the events of 9/11/2001 or the Iraqi war on the US and World economy.

4. The controversies on outsourcing of jobs in US and Europe also impact the future projections.

5. IT / ITeS are essentially in the services sector and the performance of IT / ITeS is driven by the performance of other sectors like Industry, and services sectors of the economy.

6. Though there is a plethora of studies conducted on providing projections for ICT sector revenues at Global and domestic level, there is limited data on projections for ICT manpower demand segment wise.

7. With regard to Hardware Sector of Indian ICT availability of data on revenue growth and manpower requirements is very much limited.

8. Most of the organizations have some plans and projections for ICT investments and spending, but the projection on ICT manpower requirements is hazy or absent.

9. During the research study the team noted that not many organizations prepare any kind of manpower planning in a scientific and systematic manner. There is not enough data on manpower planning where the organizations project their future requirements in terms of qualifications, skills and levels.

10. About 2000 questionnaires are mailed to ICT service providers and IT users for primary data collection and the response to the mail survey was very limited. Ultimately the research team could get about 300 questionnaires duly completed by visiting organizations in New Delhi, Mumbai, Hyderabad, Bangalore, Chennai and Pune and by having personal interactions.

11. The reason for limited responses to the questionnaire survey appears to be mainly due to lack of relevant data as most of the organizations have not done adequate formal planning, particularly in terms of ICT manpower requirements.

12. In the course of the interactions with the organizations, they also indicated that because of the inherent nature in global and domestic ICT markets they were not able to provide projections on revenues and manpower.

13. In responding about the Quality of ICT professionals to the questionnaires circulated, the organizations appear to be hesitant as any adverse comment on the quality of manpower they are getting will reflect on the company image.

14. The data in unemployment and underemployment of Qualified IT personnel is quite inadequate as these candidates do not normally register with employment exchanges.

15. While the Global ICT Industry passed through a down turn during 2000-2002, a number of qualified and experienced ICT professionals lost their jobs in Indian as well as in overseas. No data is available on how many Indian ICT Professionals lost their jobs in this period and how many of them could get employed when the market started picking up in 2003.

16. Lack of Scientific ICT Manpower Planning at Macro and Micro levels is a major limitation.

17. Lack of adequate and comprehensives data bases on ICT Manpower is also a serious limitation for the study.