Chapter 13

INFORMATION TECHNOLOGY: GROWTH AND DEVELOPMENT STRATEGY

IT SOFTWARE AND SERVICE INDUSTRY[1]

Information Technology (IT), a knowledge-based industry, has the tremendous potential of becoming an engine of accelerated economic growth, productivity improvement for all sectors of the economy and means of efficient governance. It enhances access to information, protects consumers, provides access to government services, makes skill formation and training more effective, improves delivery health services, and promotes transparency. It provides tremendous employment potential and linkages between government and the people both at the rural and urban level. Investment in knowledge-based industries will determine the level of the country's dominant position in the world economy in the next two decades.

Status of IT Software and Service Industry in India

The Indian IT software and service industry has emerged as one of the fastest growing sectors in the Indian economy, with a growth rate exceeding 50 per cent in exports and 40 per cent in the total IT industry over the last five years. Table 1 shows the turnover of this industry including domestic and exports.

Table 1
Indian Software and Service Industry (USb$)

Year	Domestic	Exports	Total	Percentage Growth Rate (Export)	Percentage Growth Rate (Domestic and Export)
1994-95	0.35	0.485	0.835		
1995-96	0.49	0.734	1.224	51.34	46.60
1996-97	0.67	1.085	1.755	47.82	43.40
1997-98	0.95	1.750	2.700	61.29	53.80
1998-99	1.25	2.650	3.900	51.43	44.40
1999-2000	1.70	4.000	5.700	50.94	46.10
2000-01	1.96	6.300	8.260	57.50	44.90

Source: Based on Hanna (1994), Heels (1995) and Masco (2001)

Exports declined during 2001-02, primarily due to the slow-down in the US economy after the 11 September 2001 terrorist attack. However, the NASSCOM-McKinsey Report 2002 has projected that the Indian IT software and service industry will still achieve a turnover of US$ 80billion (approximately 7.0 per cent of GDP) by 2008, because of the expected increase in the IT Enabled Services (ITES) sector.

The IT software and service industry has been categorized into three broad sectors:

- Software Product and Technology Services,

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[1] The electronics hardware, including computers and peripherals, have been dealt with separately in Chapter 6, entitled `Industrial Development'.

- IT Services, and
- IT Enabled Services.

The projected turnover of industry in India by 2007 and 2008 is given in Table 2.

Table 2
Projected Turnover of IT Software and Service Industry in India by 2007 and 2008

Category	By 2007* (US$ b)	By 2008 (US$ b)
A. Exports Software Product and Technology Services IT Services IT Enabled Services	8 22 18	11 30 24
Total	48	65
B. Domestic	12	15
(A+B)	60	80

Source: *NASSCOM-Mckinsey Report, 2002.* * Calculated on the basis of 34% growth rate

Status of IT Software and Service Industry in Punjab

During the eighth plan period, i.e., 1992-1997, there was hardly any activity in the IT software and service industry in Punjab. It made a beginning only when the Software Technology Park (STPI) of the Government of India came into operation at Mohali in 1998-99. Since the announcement of the policy of tax holiday for STPIs by the Government of India for a period of 10 years, 145 software units have registered with STPI Mohali till 2001-02. However, the number of units in operation is only 65. Table 3 shows the state-wise software exports of India through STPI during 2000-01.

Table 3
State-wise Software Exports through STPI* of India during 2000-01

State	Exports (in crore)	Percentage
Karnataka	7475	37.27
Tamil Nadu	2956	14.74
Maharashtra	2570	12.82
Andhra Pradesh	2017	10.06
Uttar Pradesh	1660	8.23
Haryana	1450	7.23
Delhi	1100	5.49
West Bengal	250	1.25
Orissa	200	1.00
Kerala	141	0.70
Gujarat	102	0.51
Punjab (STPI, Mohali)	**52**	**0.26**
Madhya Pradesh	50	0.25
Rajasthan	30	0.15
Total	20054	100.00

Source: Software Technology Parks of India, New Delhi
Note: *   Software Technology Parks of India

Table 4 shows IT software and service exports through STPI, Mohali (Punjab) from 1998-99 to 2001-02. In 2001-2002, the exports were Rs. 70 crore.

Table 4
IT Software and Service Exports through STPI, Mohali

	1998-99	1999-00	2000-01	2001-02
IT Enabled Services	4.70	7.01	17.36	30.00
Software Development	3.07	7.79	34.64	40.00
Total	7.77	14.80	52.00	70.00

Source: Software Technology Parks of India, Mohali

During the last two years, the private sector has been in the process of setting up IT infrastructure in Punjab: Mahindra & Mahindra software technology park in Mohali; Reliance, HFCL and VSNL are setting up telecom infrastructure in Punjab. The progress is rather very slow. The share of Punjab in the Indian IT software and service industry is very meagre, i.e., 0.26 per cent in 2001-2002. (See Table 3)

During the Ninth Plan, there has not been any significant progress in the IT industry, in spite of the fact that the policies of the Punjab Government are as attractive as of such other states as Karnataka. Some of the specific constraints for the insignificant growth of IT Industry are as follows:

- Quality of infrastructure required for IT industry was not available.
- Quality of human resource was not matching with IT industry's requirements.
- Insufficient funds for IT industry.
- Lack of direction and vision.
- Non-conducive environment.

The IT industry in other states of India, where high quality infrastructure and trained manpower are available, has achieved accelerated growth and increased its share from 0.6 per cent to six per cent of the total turnover of the IT industry in India during the last five years, mainly due to robust growth in the ITES segment. The IT Industry in Haryana has grown from a turnover of Rs. 400 crore in 1999-2000 to Rs. 2,054 crore in 2000-01, an almost five fold increase. Punjab, therefore, can also aim at and achieve five per cent share of the total IT industry in India by the year 2007, with emphasis on ITES. In view of the present status of the software industry in Punjab, i.e., 0.26 per cent share, the projection of five per cent share by 2007 is very optimistic. To achieve this, a fast track approach will have to be adopted. The suggestions and recommendations made in this report have to be implemented to ensure such rapid growth. A conducive environment must be created to ensure that both national and international MNCs set up IT industries in Punjab.

For achieving a five per cent share, it is recommended that targets be fixed for a four per cent share of the national turnover (according to the NASSCOM-McKinney, Report 2002) for software products and technology services and the same for IT services, because each of these involves high technology and longer gestation period, and a seven per cent share for IT Enabled Services, as it has a shorter gestation period and a huge employment potential. Projected category-wise turnover of IT software and service industry in Punjab by 2007 is shown in Table 5.

Table 5
Projected Category-wise Turnover of IT Software and Service Industry in Punjab by 2007[*]

Software and Service Industry	Targeted percentage share for Punjab in terms of projected national turnover	Turnover in 2006-07 Rs. in Crore (In US$ b)
A. Exports "Category A" Software Product and Technology Services "Category B"	4	1600 (0.32)
IT Services "Category C"	4	4400 (0.88)
IT Enabled Services Total	7	6300 (1.26) 12300 (2.46)
B. Domestic	5	3000 (0.60)
(A+B)	5	15300 (3.06)

Source: Projections based on Nasscom-Mckinsey Report, 2002

Software Product and Technology Services provide a high growth opportunity for the Indian software industry. Indian companies have a market potential of software product development, such as enterprise software (e-business solution, ERP, e-corporate governance), consumer software (personal productivity tools) and embedded software. Indian companies have developed a number of highly acclaimed and popular packages, such as HR management and business accounting by TCS, banking automation packages by Infosys, ERP tools by RANCO, etc.

This segment is high-technology oriented and requires highly skilled professionals. In the shorter term, there will be limited development in the area, as R&D budgets of the companies are limited. Taking these factors into account, Punjab has to aim to achieve at least four per cent of US$ 8billion, i.e., US$ 0.32billion (Rs. 1,600 crore) by 2007 (Table 5).

IT Services are undergoing a structural change from client/server to web/package-based services. This will form the major chunk of IT services. Growth in IT services will continue to provide the biggest opportunity, while other sectors of IT software industry will also make a significant contribution. IT services, both export and domestic, will grow rapidly as new opportunities are emerging in management/consulting services, application maintenance and Internet services. The major users of IT services are the government, financial services and banking, manufacturing and retail and distribution. New areas likely to emerge are communication, healthcare and utilities, as these will increasingly be deregulated. However, IT services essentially require high-quality manpower, state of the art skills, world-class telecom and IT-knowledge based environment.

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[*] A detailed report has to be prepared for all major activities/segments on the pattern of Andhra Pradesh. To project year-wise targets and for their monitoring, a detailed survey has to be carried out to prepare the report.

The importance of IT services can be judged from the fact that they will account for 45.8 per cent of the total turnover of the software industry, i.e., US$ 22billion out of US$ 48billion projected export by 2007. Punjab should aim at achieving at least four per cent of US$ 22billion, i.e., US$ 0.88 billion (Rs. 4,400 crore) by 2007 (Table 5)

The ITES sector in India has emerged as a key engine of growth for the Indian IT industry and the technology-led services industry. This sector has grown from Rs. 2,400 crore in 1999-2000 to Rs. 4,100 crore in 2000-2001, providing employment to 70,000 people.

It covers a wide range of services, some of which are:
- Customer-interaction services including call centres.
- Back offices, revenue accounting, data entry, data conversion and HR services.
- Transcription and translation services.
- Content development and animation.
- Other services, including remote education, data search, GIS, market research and network consultancy.

The employment potential in ITES is substantial and the gestation period is lesser than in other sectors of the IT industry. It is highly quality-oriented, human –resource intensive and requires consistent performance with high standards. Therefore, the success of ITES will mainly depend on the quality of manpower and infrastructure. Knowledge-based skill-oriented training is the key to quality of manpower. ITES to succeed requires top-class infrastructure with adequate bandwidth, fault-free and continuous power with two layers of redundancy to avoid any breakdown.

US technology firms are rapidly shifting back-office functions to India. Foreign firms are eagerly waiting to set up centres to process financial claims, payroll-data, building customer-support desk, etc. According to a NASSCOM study, GE Capital has saved US$ 270million, CITI Bank US$ 70million and British Airways (BA) US$ 42million, a total of US$ 385million saved per year, as a result of their shifting back-office operations from US to India. Most of the firms already in India are in the process of expanding and eager to set up operations in other areas of the country.

ITES, or remote processing, presents a golden opportunity for Punjab. For this, the state has to emphasize on skill-formation through world-class training and infrastructure building. Punjab needs to garner at least seven per cent share of the total revenue of India in ITES. This can provide employment to 77,000 educated youth and generate a turnover of US$ 1.26billion (Rs. 6,300 crore) by 2007 (Table 5).

A high-level committee of experts should be constituted for the promotion of the IT industry in the state to formulate a policy for ensuring a hassle-free and conducive environment to attract MNCs and NRIs to set up IT industries in Punjab. Special emphasis has to be placed on NRIs, keeping in view that a large number of them from Punjab are actively involved in the IT industry in USA and other developed countries. The proposed committee of experts should also monitor the growth of the IT industry in the state.

IT HUMAN RESOURCE DEVELOPMENT

India's main competitive advantage in the software and services industry is its abundant English-speaking and cost-effective human resource. As on 31 March 2001, it has 3,40,000 people working in the software and service sector in India, the second largest IT workforce after the US. According to the projections of the *Ministry of Information Technology (MIT) Report*, India needs to develop more than 22 lakh high quality knowledge workers in software and related areas by 2008.

To achieve an overall target of five per cent of the national turnover, i.e., US$ 3.06billion by 2007 (Table 5), Punjab would need 99,000 IT-trained manpower which has to be high quality and of the right mix of technical, business and functional skills to meet the needs of all business segments.

According to the *MIT Report*, human resource in IT has been categorized into three categories: Category 'A' includes higher-end professionals, category 'B' comprises professionals mainly for IT services and category 'C' for ITES. To achieve the projected turnover, Punjab needs 6,000 professionals for category 'A'. 16,000 for category 'B' and 77,000 for category 'C'. Table 6 shows the projected category-wise IT manpower requirements by 2007 in Punjab (Table 6).

It is necessary to formulate appropriate strategy and measures in respect of requisite infrastructure with special focus on human resource, taking into account emerging educational technologies, to achieve the projected turnover of the Punjab IT industry. The total estimated cost of manpower-quality improvement is Rs. 60 crore during 2002-07. (Rs. 30 crore for Category 'C' and Rs. 15 crore each for Category 'A' and Category 'B')

Table 6
Projected IT Manpower Requirements during and by 2007 in Punjab

	Qualification	Estimated IT Manpower Requirements (India)	Projected IT Manpower Requirements as percentage of the National Requirement
Category 'A' Software Product and Technology Services	MS/M.Tech/B.Tech in Computer Science	1,50,000	6,000 (4%)
Category 'B' IT Services	B.Tech in Non-Computer Science, MCA	4,00,000	16000 (4%)
Category 'C' IT Enabled Services	BA/B.Sc/B.Com & Diploma and it is	11,00,000	77,000 (7%)
All		16,50,000	99,000 (6%)

Source: Projections based on Ministry of Information Technology, Report for Tenth Plan (2002-2007), Government of India. Figures have been proportionately adjusted as per the revised projections by NASSCOM-Mckinsey Report, 2002, from the earlier NASSCOM-Mckinsey Report, 1999.

Recommendations for IT HRD

- For quality improvement, Punjab has to train 99,000 high-quality manpower during 2002-2007. IT services (16,000), IT software product and technology services (6,000) and ITES (77,000).
- Upgradation, including networking, of infrastructure of the engineering colleges.
- Training of faculty to meet the required standards. Interaction and exchange of faculty members with institutes of higher learning in India and abroad.
- An IIT of an international standard should be set up to move up the value chain in IT industry. It will help the state catch up with other IT-developed states in India. It will also help to fill the much-needed gap in the availability of quality human resource.
- To ensure that high-quality IT manpower is being produced by both government and private institutions, it is recommended that Punjab Government should set up a State Council for Computer and IT Education (SCCE), a body of experts responsible for monitoring and fixing minimum standards for the quality of IT education in the state.

IT INFRASTRUCTURE

In today's IT-savvy world, the growth of every economy is linked with the growth of Information Technology and, in turn, sound and quality infrastructure is absolutely essential for this.

During last decade, the main contribution towards building IT infrastructure has been the Software Technology Park at Mohali, where private sector companies are in the process of setting up telecommunication infrastructure. So far the performance of Punjab has been dismal as compared to other IT-developed regions in India. During 2000-2001, out of the total export of Rs. 20,052 crore from STPIs across the country, Punjab had a total export of Rs. 52 crore, while Bangalore Software Technology Park had an export of Rs. 7,475 crore, Noida Rs. 4,350 crore, Chennai Rs. 2,956 crore, Mumbai Rs. 1,610 crore and Pune Rs. 960 crore.

It is vital to develop the quality IT infrastructure required to achieve the projected turnover of US$ 3.06billion by 2007 (Table 4) and to meet the other infrastructure requirements for IT-usage in various applications, including e-governance.

The main constituents of IT infrastructure are telecommunication-backbone both national and international, V-SAT infrastructure and Internet Service Providers (ISPs). IT software and services including ITES and Internet are among the major users of the IT infrastructure with adequate communication bandwidth. This sector is very sensitive to the quality as well as the size of the infrastructure. Presently, the infrastructure that exists in the telecommunication sector in Punjab along with the implementations of the future plans of the VSNL and other private operators such as HFCL and Reliance, is likely to meet the basic requirement of IT infrastructure in terms of good-quality connectivity by 2007. IT infrastructure being vital for the development of the IT Industry, the Ministry of Information Technology (MIT), Government of India in their Tenth Plan has recommended special norms for bandwidth. The Punjab Government has to ensure its timely and speedy implementation.

According to the study by NASSCOM, by 2002, the requirement of international bandwidth for connectivity to Internet was projected to be 100 GbPs. However, these projections could not be achieved as the expected growth of Internet could not take place, due to very high telephone tariff along with equally high cost of Internet backbone. This has resulted in inadequate demand. The number of Internet users and the availability of bandwidth are linked with each other; as such the bandwidth requirement is market dependent.

However, recently the basic service providers have reduced telephone charges, but the numbers of Internet users/Internet subscribers are not increasing at the expected rate. The Punjab Government has to formulate a policy to ensure usage of Internet in all its departments, public places, down to block and village level. It has to ensure adequate demand by way of creating a suitable IT culture and suitable infrastructure, so as to improve the viability of the ISPs.

It is proposed to develop three new IT cities and upgrade the existing infrastructure at Mohali, to achieve the projected turnover of the IT software industry. The infrastructure and quality should be such that each IT city should be able to generate, on an average, a turnover of between Rs. 3,000-5,000 crore yearly by 2007. The proposed IT cities should have, besides good quality telecom infrastructure, adequate basic infrastructure in terms of continuous uninterrupted power supply, good quality roads, efficient transport, proximity to airport, a good education and an R&D centre. The selection of these IT cities has to be based on the academic environment. Keeping this in view, the proposed new cities are Patiala, Jalandhar and Ludhiana. They have the academic environment suitable for the growth of the IT industry as already in place. However, these can be easily upgraded further so as to become `Centres of Attraction' for investors to set up their production/research and development facilities in the field of information technology. The estimated cost of each IT city may be of the order of Rs. 150-200 crore and the cost of upgradation of the infrastructure at Mohali will be another Rs. 50 crore. Detailed proposals for each IT city have to be drawn up separately. Each city will have an STP as a prime mover. It is proposed that each IT city should have a separate development authority on the pattern of the Noida Development Authority, and function independently, to ensure its proper growth and development.

Venture Capital (VC) has played a vital role in the materialization and commercialization of innovative and creative ideas. The Indian software and service industry has emerged as one of the fastest growing sectors in the country. A large number of software companies, started by research-minded professionals with innovative ideas, have benefited and have succeeded in their ventures, with the help of the initial funding through seed money and venture capital. USA is a prime source of venture capital. According to the Indian Venture Capital Association (IVCA), venture capital funding in India was US$ one billion in the year ending March 2002 and is likely to go up by 50 per cent to US$ 1.5billion in the current financial year.

The state government has already taken the initiative in this regard by setting up a Rs. 20 crore venture fund for the growth of the software industry in the state. It is suggested that fund be increased to Rs. 50 crore and a special allocation of Rs. 30 crore be made for the IT industry in the state. However, the state has to play a more proactive and pragmatic role by providing funds to bright young talented entrepreneurs, so that start-ups and ventures by qualified professionals are not unsuccessful for want of initial financial assistance. This will go a long way in building confidence among the

prospective young entrepreneurs and will create a much needed conducive and enabling culture, important for the growth of the IT software and service industry in the state.

E-GOVERNANCE

The objectives of egovernance are information dissemination to the public with any where or any time services to citizens, making the government machinery more easily accessible, transparent, effective, efficient, and accountable. A comprehensive citizen-service portal should be set up for this purpose, with such services as issuance of general certificates; services related to taxes, revenue, transport, permits and licenses, registration of all types; pension schemes, social security and welfare schemes; education training; employment; housing; infrastructure; financial assistance schemes; industries; agriculture; and other miscellaneous services. This will not only help implement e-governance but will also inculcate and create an IT culture in the state.

Implementation of e-governance necessitates top priority to computerization and networking of different departments at the headquarter, district and block level; identification of key departmental applications; creation of data-bases, digitization of public domain information; and availability of departmental data on a day-to-day basis.

The state government has already taken up an ambitious e-governance project, called e-Governance-Citizen Interface, to implement egovernance. It has chosen Fatehgarh Sahib as a pilot district for the implementation of this project. It envisages extension of the communication network, including hardware and software, within the district to connect the different offices linked with the DC office, which further will be connected to district centres and state headquarters. The state should ensure the completion of the project in Fatehgarh Sahib and set up similar projects in other districts so that government and the people draw maximum benefit from IT and e-governance.

To facilitate and implement egovernance in the state, the following measures are recommended:

- Launch a massive programme for rural and urban connectivity. Establish Punjab-wide Area Network (PUNWAN) to provide connectivity between state headquarters, Secretarial Area Network, Department Local Area Network, districts, sub-divisions, blocks and villages
- Facilitate estimated 2.5 million Internet connections by 2007, in line with the policy of the Government of India
- Facilitate IT kiosks within the cycling distance of four to five kms, including rural areas, by 2005, through private sector participation. Government of Punjab should progressively make available access to Internet connectivity and e-mail facility in all government offices.
- Launch a programme for training panches and sarpanches at the village level and mayors and deputy mayors at the municipal corporation level.

According to the recommendations of the Working Group on IT for Masses, set up by the Government of India, five per cent of the state's total budget should be allocated for IT induction. Punjab has already set up Department of Information Technology (DoIT). It is proposed that it should be further strengthened in terms of expertise and funds. It is recommended that at least 0.5 per cent of the budget in the first year, progressively

increasing it to two per cent in the terminal year of the plan period, should be utilized for promoting and implementing e-governance.

It is strongly recommended that e-governance of the state should be implemented in a holistic and integrated manner through a monitoring cell, with defined rules and procedures based on principles of equity, responsibility, transparency and accountability. It should be able to monitor the performance and the status of all the projects, departments and ministries against the set targets. In case of non-performance, the monitoring cell will receive an alert signal and the cause.

IT FOR MASSES

The rural population in Punjab constitutes 65 per cent of the State's population. Being predominantly an agricultural state, the quality of life and the health of the its economy is largely driven by the performance of the rural sector. Information technology provides new opportunities to tackle problems related to rural poverty, health, illiteracy, unemployment and environmental degradation. The special IT Task Force, constituted by the Government of India, has recommended the use of state-of-the-art information technology for the development of agriculture and rural development, on the lines of the successful Warana project in the Kolhapur and Sangli districts of Maharashtra.

This project effectively demonstrates the contribution of an IT infrastructure to the accelerated socio-economic development of a cluster of 70 contiguous `Wired Villages'. The project aims to utilize IT to increase the efficiency/productivity of the existing co-operative enterprise, by setting up a state-of-the-art computer communication network and create a data-base of villages on different socio-economic aspects such as health, education, water supply, sanitation and population. It also provides information on agricultural-related schemes, employment generation schemes, and government procedures for getting ration cards, birth and death certificates, etc., to the villagers.

It is proposed that Punjab should adopt the `Wired Village'" concept to network its 12,400 villages with all information and communication facilities, including Internet. To cover the entire state, a total of 138 `Community Information Dissemination Centres' (CIDCs), one each at the block level, should be set up, which will be linked to every village. These centres will also effectively disseminate information related to the 29 subjects transferred to the Panchayats under the 73rd Amendment to the Constitution. CIDCs also function as IT kiosks and will provide direct linkages between the masses and the government. CIDCs will further organize training of panches and sarpanches in the use of IT and its benefits for their day-to-day requirements.

The total investment for setting up such 138 Centres has been worked out to be Rs. 372 crore, at the rate of Rs. 2.7 crore per CIDC. (On an average rupees three lakh per village and one CIDC will cover 90 villages). It is recommended that the Punjab makes efforts to get the project funded by the Government of India. (Government of India has already funded a similar project in the Northeast region of the country at a cost of Rs. 220 crore covering 487 centres). The programme is on a revenue-sharing basis and is to be so formulated that, after an initial gestation period of two to three years, CIDCs will be self-sustaining. It would also provide employment to approximately 25,000 educated youth in the rural areas of Punjab during 2002-2007. The Government of India has already made provision for requisite investment covering 6,000 CICs (CIDCs) to be set up all over the country, as reported in *MIT Report on Tenth Five Year Plan.*

CIDCs will also help in improving productivity and performance of agriculture. Support and services of various stakeholders and extension agencies, such as Punjab Agriculture University, Ludhiana, State Agriculture Department, Mandi Board, Markfed, Sugarfed, etc., and other agriculture-related industries should also be taken up for updating the latest information on products and services, new technologies and practices.

IT can be used in all aspects of agriculture. It can play a major role in crop management, enhancing productivity and crop yields through information on farm practices, seeds, other inputs of production, weather information, enhancing realization, cutting down intermediaries, better pre- and post- harvest management, water utilization and management, pest and disease control, etc. The Land Information System can provide information about markets, food-pricing, imports and exports, tariffs and quotas, underproduction and over production, and physical information about soils, hydrogeology and rainfall, etc. IT applications can be effectively used for management and monitoring of environment resources, pollution warning systems, environmental emergency management systems for floods, forest fires and other natural disasters.

IT can also be suitably employed in small and tiny industries for online and real-time information to help small and marginal artisans in their sales and marketing efforts. This will not only help them earn better and boost their morale, but preserve these rare skills, which otherwise are on the verge of extinction.

The Government of India has proposed the setting up of a network called, Vidya Vahini, to carry the benefit of IT to the students, Today, in India, there are more than nine lakh schools catering to the needs of more than 25 crore students and one crore teachers. Most of these schools have no access to the information age. Under the Vidya Vahini programme, schools and higher learning institutes are proposed to be connected with an integrated voice, data and video network. The Government of India has proposed to introduce this programme in two phases. In the first phase, i.e., in the first two years of the plan, 60,000 schools are proposed to be connected to the network. Punjab should get 5,000 schools networked in the first phase and 5,000 more in the second phase.

It is estimated that rupees two lakh will be required for each school, to implement the recommendation of Government of India, It is also recommended that all these schools should only be from rural areas. Timely and speedy implementation of the project by the state will go a long way in furthering the use of IT for the masses.

RESEARCH, DESIGN AND DEVELOPMENT (RD&D)

Nations investing in human resource development, research & development and high quality university education have achieved worldwide leadership and scholarship. Today, the Quality-of-Life index in those nations is unparallel as compared to other developing nations. In the liberalized, globalized environment, under the WTO regime, it has become imperative to develop technologies, newer products and services of international quality, to remain competitive. Research and development is the way to meet this challenge. In the field of IT in India, most of the research and development projects have so far been sponsored and funded by the Government of India. However, Karnataka, Andhra Pradesh and Maharashtra have undertaken a few design and development projects sponsored and funded by the respective governments.

RD&D is vital for the growth and development of the IT industry, for Punjab to become a leading IT destination and move up the value chain, Design and development projects with commercial potential should be identified and the participation of the private sector in them encouraged. The state must focus on short-term as well as long-term RD&D projects. Short-term projects with direct applications in industry, involving less risk and a short gestation period, should be taken up on a priority basis. Other important areas include development of software for the computerization of different government departments and application software for rural masses in the local language.

In the longer term, the state must focus on key emerging technologies, such as wireless technology, second generation Internet, software level integration, and motivate MNCs to set up their RD&D centres in Punjab and financial and technical participation of international agencies to leverage their worldwide experience. The concept of subcontracted research with system-integration should be encouraged to help in developing system-integration expertise and design of products.

An exclusive R&D fund has to be set up to formulate and implement these RD&D programmes, Rs. 20 crore may be allocated during 2002-07. In addition, technical and financial support and participation by the Government of India, international agencies, MNCs and private sector are important.

INVESTMENT WITH SUGGESTED SOURCES DURING 2002-2007

(Rs. in crore)

Area	Estimated total Investment	To be funded by Punjab Govt	To be funded by GOI	To be funded by Private sector
Human Resource Development				
a) HRD Quality improvement	60.00	45.00	--	15.00
b) Setting up an IIT	150.00	--	150.00	-
IT Infrastructure				
a) Setting three IT cities at Patiala (Rs. 175 crore), Jalandhar (175 crore and Ludhiana (Rs. 175 crore and upgrading Mohali (Rs. 50 crore)	575.00	115.00	--	460.00
b) Venture Capital Additional fund for IT	30.00	30.00	--	--
E-Governance				
0.5 per cent in the first year to 2.0 per cent in the last year of the plan	188.6	188.6	--	--
IT for Masses				
Setting 138 wired CIDCs at block level	372.00		186.00	186.00
Vidya Vahini Programme (GOI) for 10000 Schools	200.00		200.00	--
Research Design & Development				
	20.00	20.00	--	--
Total	1595.60	398.60	536.00	661.00

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