

Chapter 1

Introduction

Throughout history, mankind has passed through several of development stages; from agricultural age where the economy was based on land and work, to the industrial age where capital became the third factor of production and to information age which is characterised by yet another factor-information.

In the Information Age, the gap between the rich and the poor threatens to widen, not only within countries, but also between developed and developing countries. Countries with greater powers of acquisition have easier access to new technologies and take greater advantage of them. Given this situation, it is imperative that developing countries redouble their efforts to prepare themselves to successfully meet the challenge and maximise the opportunities that the Information-Based Economy offers. This is not an easy job – there are many dimensions and factors associated with what it means to achieve a level of preparedness in the modern interconnected or digital world. Countries must first have a solid grounding in the Information and Communication Technologies (ICTs) that underlie telecommunications and computers, such as the Internet's World Wide Web – one of the most important invention since the telephone and television.

There are a number of social scientists who believe that we are now living in a new “Information Age”. There are others who have serious doubts about the validity of the notion of an “information society” [Webster, 1997]. Irrespective of the reach and spread of this new age, one must concede that there has been some sort of change in the world economy during the past two decades. This change has been empowering for some and marginalising for some and has been in some way related to Information and Communication Technologies. The World Development Report 2000-2001 states “the global forces of integration, communication and technological advance have proceeded apace, bringing significant advances to some. But they have bypassed others”.

There is increasing recognition of the potential of technology in improving the quality of human life. The Human Development Report 2001 says that “technology is like education –it enables people to lift themselves out of poverty. Thus, technology is a tool for, not just a reward of, growth and development”.

Like with all paradigms, this one too has attracted its share of criticism and praise. On one side of the spectrum there are those who swear by the immutable need for information technology and its vast potential to bring about development. On the other side, there are those who focus

on the exclusion and misery that it can bring about in people's lives. Everything in this world is Janus-faced, so is technology. "If technology offers particular benefits for the developing world, they also pose greater risks"[Human Development Report 2001]. Thus, the key to harnessing information technology in developing countries is by applying it to situations where it is appropriate, affordable and beneficial and this is often not easy to figure out apriori.

Since there is a possibility that information technology can lead to exclusion, special care must be taken to see that its use leads to greater capabilities and greater choices among people, the poor in particular.

Developing countries must also reconsider their strategies concerning integration into the world economy, since economies no longer depend so much on their endowment in traditional areas of land and labour as much as they do on development of human resources and better use of ICTs. In the Industrial Age, countries with an abundance of land, labour and capital were almost inevitably the leaders in economic growth. But, in the Information Age, countries without high levels of these resources can hope to accelerate development if they are able to develop knowledge, which, combined with adequate ICT-related infrastructure, can allow successful integration into knowledge-based economies.

The following observation would act as a stimulant to the developing countries who do not possess great quantities of traditional economic resources:

During the 21st century, the true wealth of emerging countries will not necessarily be represented by capital, labour or natural resources, but rather by the intellectual power of the people who form their societies, and all those factors which stimulate the intellectual development of these people. A few economists disagree with the concept of 'National Competitiveness' as economic prosperity of nations is not a zero sum game as one would witness in competition amongst firms. The parallel view is that ICT and increase in productivity in various industry segments are linked through three channels:

- Direct productivity gains in industries that produce IT goods;
- Capital deepening and improvement of labor productivity because of investment on information technologies;
- Spill over effects such as increasing returns to scale due to network externalities, especially through increased connectivity brought about by the Internet.

However, ICT planning in the developing countries could adopt a different approach to development of ICT applications. One such approach could be Sen's *Capability Approach*, which adopts a holistic and humane view to the goals of development by looking at the degree of integration the deprived segments of society attain after application of ICT as an e-governance tool.

In a similar manner, Brown's *Information Based Approach* suggests that the change in the degree of linkage, coverage and direction of information through the use of ICT be used as an evaluative tool. It is these yardsticks which should be used to decide the resource allocation by the planners.

Though we are adopting an unconventional use of the term e-preparedness, the way in which the term has usually been used is illustrated below.

One of the first e-readiness global level reports, by McConnell International, states: "Electronic preparedness measures a nation's capacity to participate in the digital economy. Electronic preparedness is the source of economic growth in the century of interconnectedness and the requisite capacity to carry out successful electronic business. Neither countries nor businesses can prosper if the main electronic pillars are not in place. For those countries, which have only taken their first steps, the rhythm at which the changes are taking place implies complacency on their part, which is a danger to their future development."

Networked World, a study by Harvard's Center for International Development, says that computer, telecommunication and above all Internet technological development, as well as the convergence of these industries, have converted the planet into an immense interconnected web of individuals, firms, schools and government. They communicate and interact with one another through diverse channels. In practical terms, a "networked world" can be seen as a web of communication networks in which it is possible to send and receive information in a variety of digital formats anywhere in the world using a variety of transmission media. While considering the benefits of such a networked world, it is important to note that success in the Information Age depends on how widely integrated information and communication technologies are to society in general. New value proposals based on ICTs emerge as individuals begin to accept and understand its use. This behaviour and attitude change leads us to creative solutions and new models, which can radically transform the way in which commerce, hospitals, schools and government function.

Defining E-Readiness

A society's electronic preparedness can be seen as the degree to which the society can participate in the advantages and opportunities of a knowledge-based society and accept the challenges that such environments pose. It is measured by judging the relative advance of the most important areas for the adoption of the ICTs and their most important applications. A country's e-readiness must be evaluated in order for it to define policies that will allow it to insert itself more effectively into the Knowledge Based Economy.

It must be noted that national economies vary in the degree to which they can currently take advantage of ICTs. Developing nations are almost by definition less prepared in this sense than more developed countries, and national policies of these nations will accordingly have to vary taking advantage of these different circumstances. For some countries, it will be relatively easy to advance to a successful insertion into the Networked World while others will have greater difficulty achieving this goal. Knowing a country's situation is fundamental to designing and executing programmes which seek to develop those areas in which the country finds itself relatively weak and improving or at least sustaining the conditions in which the country is strong.

Based on Sen's Capability Approach and Brown's Information Based Approach, the e-readiness definition with respect to States is as follows:

"It is the preparedness of States to provide governance equitably and cost effectively and the capability reflected in the degree of integration the deprived segments of society attain after application of ICT as an e-governance tool. Apart from this, the ability of the state to provide business, the capacity to participate in the provincial level digital economy and further networking with the national level digital economy."

With respect to the Central Ministries/Departments, the definition of e-readiness has been narrowed down, the focus is more on output and not on "outcome" of the e-governance initiatives:

"E-Readiness is the degree to which a country is prepared to participate in the networked world. It would demand the adoption of important applications of ICTs in offering interconnectedness between government, businesses and citizens."

E-Readiness can be defined in many other ways as the definition varies from study to study. Some of the definitions are given below:

- **McConnell International's Risk E-Business: Seizing the Opportunity of Global E-Readiness**

McConnell International prepared this report in collaboration with World Information Technology and Services Alliance (WITSA) to assess a national economy's e-readiness, or "capacity to participate in the global digital economy." McConnell International says that an 'e-ready' country has extensive usage of computers in schools, businesses, government, and homes; affordable reliable access in a competitive market; free trade; skilled workforce and training in schools; a culture of creativity; government-business partnerships; transparency and stability in government and an evenly enforced legal system; secure networks and personal privacy; and regulations allowing digital signatures and encryption.

- **CSPP's Readiness Guide for Living in the Networked World**

The Computer Systems Policy Project (CSPP) a "public policy advocacy group...comprised of the Chairman and Chief Executive Officers" of US information technology companies developed this guide to help individuals and communities determine how prepared they are to participate in the "Networked World." They defined E-Readiness as follows: "An 'e-ready' community has high-speed access in a competitive market; with constant access and application of ICTs in schools, government offices, businesses, healthcare facilities and homes; user privacy and online security; and government policies which are "favourable to promoting connectedness and use of the Network."

- **APEC's E-Commerce Readiness Assessment**

The Asian Pacific Economic Cooperation (APEC) Electronic Commerce Steering Group developed this guide "to help governments develop their own focussed policies, adapted to their specific environment, for the healthy development of e-commerce."

A country that is 'ready' for e-commerce has free trade, industry self-regulation, ease of exports,

and compliance with international standards and trade agreements. This is how APEC's e-commerce readiness assessment defines e-readiness.

- **CID's Readiness for the Networked World: A Guide for Developing Countries**

The Center for International Development at Harvard University developed this guide. "The guide...systematically organises the assessment of numerous factors that determine the Networked Readiness of a community in the developing world." This assessment is meant to serve as a basis for further analysis and planning.

An 'e-ready' society is one that has the necessary physical infrastructure (high bandwidth, reliability, and affordable prices); integrated current ICTs throughout businesses (e-commerce, local, ICT sector), communities (local content, many organizations online, ICTs used in everyday life, ICTs taught in schools), and the government (e-government); strong telecommunications competition; independent regulation with a commitment to universal access; and no limits on trade or foreign investment.

As seen from the existing literature, three factors motivating developing country decision-makers to improve e-readiness and promote the adoption of ICT in their countries are: First, ICT promises enormous benefits as part of the solution to economic and social problems; second, countries face the threat of being left further behind if they do not address the growing digital divide both between and within countries; and thirdly, international leaders, foreign donors, and lending agencies are integrating ICT into development and aid programs.

ICT is a key weapon in the war against world poverty. When used properly, it offers tremendous potential to empower people in developing countries to overcome development obstacles; to address the most important social problems they face, and to strengthen communities, democratic institutions, a free press, and local economies. Yet, a wealth of evidence suggests that a significant dimension of the "digital divide" is the gulf that exists between potential and actual levels of ICT use in developing countries.

E-Readiness Assessment Elsewhere

Over the past few years, a number of e-readiness assessments have been carried out. On the surface, each assessment gauges how ready a society or economy is to benefit from information technology and electronic commerce. On closer examination, the range of tools use widely varying definitions for e-readiness as mentioned in the earlier section and different methods for measurement. For example, Harvard University's¹ model looks at how information and communications technologies (ICTs) are currently used in a society, while APEC's² method focuses on government policies for e-commerce. We take a brief look at the work done in this field.

- **McConnell International's Risk E-Business: Seizing the Opportunity of Global E-Readiness**

The framework is designed to assess a country's capacity to participate in the global digital economy. It aims to evaluate who is e-ready, which countries are enabling businesses, government and citizens to flourish in the networked economy. The report analyses a country's e-readiness on the following dimensions:

1. connectivity (infrastructure, access and pricing),
2. e-leadership (government policies and regulations),
3. information security (intellectual property, privacy, electronic signatures),
4. human capital (ICT education, available skilled workforce), and
5. e-business climate (competition, political and financial stability, foreign investment, financial infrastructure).

The 2001 report covers 53 countries. For each country and each category, the report performs a "dynamic evaluation of the relevance and accuracy of available quantitative data with an understanding of myriad cultural, institutional, and historical factors." These general ratings and their narratives can then be used as a starting point for further planning. Countries are rated in the five categories listed above on a scale of one to three and extensive analysis and recommendations is given. The report is a good tool for business leaders trying to assess the global state of development of the Internet. However, it is difficult to gain an understanding of

the relative level of e-readiness of countries studied.

The May 2001 Mc-Connell ranking of E-Readiness Assessment indicates that India needs to make substantial improvements in the area of Connectivity. Improvements are also required in the areas of E-Leadership, E-Business, Information Security and Human Capital.

- **CSPP's Readiness Guide for Living in the Networked World**

This self-assessment tool is designed to help individuals and communities determine how prepared they are to participate in the 'Networked World'. The guide measures the prevalence and integration of ICTs in homes, schools, businesses, health care facilities and government offices, with additional focus on competition among access providers, speed of access, and government policy. This tool does not examine any given country, but presents a tool that is generally applicable.

The CSPP is a public policy advocacy group, and is comprised of chairpersons and chief executive officers of leading U.S. information technology companies.

Measurements are divided into five categories:

1. infrastructure
2. access
3. applications and services
4. economy; and
5. 'enablers' (policy, privacy, security, ubiquity).

The report provides a series of 23 questions, for community members to ask about the community itself. For each question, the users choose from a set of answers, which represent four progressive 'stages' of development. The 23 questions are divided into the five categories listed above. The assessment produces a rating that indicates which of four progressive stages of development the community is at for each of the five categories listed above. An overall 'score' for the community can be estimated by simply averaging the scores across the criteria.

- **APEC's E-Commerce Readiness Assessment**

The Asian Pacific Economic Cooperation (APEC) Electronic Commerce Steering Group developed this guide. The major goal of the tool is to help

governments develop their own focussed policies, adapted to their specific environment, for the healthy development of e-commerce.

Six categories are measured for readiness for e-commerce:

1. basic infrastructure and technology (speed, pricing, access, market competition, industry standards, foreign investment),
2. access to network services (bandwidth, industry diversity, export controls, credit card regulation),
3. use of the Internet (use in business, government, homes),
4. promotion and facilitation (industry led standards),
5. skills and human resources (ICT education, workforce), and
6. positioning for the digital economy (taxes and tariffs, industry self-regulation, government regulations, consumer trust).

Participants are asked 100 multiple-choice questions grouped into the six categories listed above. The possible answers indicate progressive levels of e-readiness for a country. No overall scoring occurs. The product of the assessment is the answers to the 100 questions. Countries are supposed to work on areas with less than optimal answers, since they are impediments to the deployment of e-commerce. In this guide, there is no hard data based analysis; assessment is based on opinions of individuals. The guide does not provide a comparative assessment of nations. Its output is a good guide for macro-level policy making but not for businesses looking for guidance on the relative e-competitiveness of nations.

- **CID's Readiness for the Networked World: A Guide for Developing Countries**

The Center for International Development at Harvard University developed this guide. It was published in 2000, and draws from the earlier CSPP guide, described above. The guide is intended to be a tool for government policymakers to assess the state of networked readiness of a community. It is targeted at communities in developing countries seeking to define a strategy to participate in the networked world. This guide measures 19 different categories, covering the availability, speed, and quality of

network access, use of ICTs in schools, workplace, economy, government, and everyday life, ICT policy (telecommunications and trade), ICT training programs, and diversity of organizations and relevant content online. The guide provides a grid with descriptions of four stages of advancement in each of 19 categories (placed into five groups). Communities estimate their current stage of development in each category. No prescription is given on how that estimate should be made. The guide rates the ‘stage’ a community is in for each of the 19 categories, and descriptions are given of what is required to be in a particular stage. The Guide does not offer prescriptions for improved readiness.

- **The Economist Intelligence Unit E-Readiness rankings, July 2002**

The Economist Intelligence Unit (EIU) e-readiness new model tallies scores across six categories: five of these include a total of 29 indicators, while the sixth is the Economist Intelligence Unit’s business environment rankings. Each variable in the model is scored on a scale from one to ten. Where possible, the variables rest on quantitative, statistical data; others reflect qualitative assessments by Economist Intelligence Unit country analysts.

The six categories that feed into the Economist Intelligence Unit’s rankings (and their weight in the model) are:

1. Connectivity and technology infrastructure (25%)
2. Business environment (20%)
3. Consumer and business adoption (20%)
4. Social and cultural infrastructure (15%)
5. Legal and policy environment (15%)
6. Supporting e-services (5%)

The main conclusions of the July 2002 rankings are North America and Western Europe dominate the top ten places, with Australia the lonely outsider. Singapore and Hong Kong lead the pack in Asia, taking 11th and 13th places, respectively, while Vietnam and Pakistan languish at the bottom of the heap, in 56th and 57th places. The same is true of Latin American, where advanced Chile ranks 28th while Ecuador stumbles into 50th place. In the Middle East and Africa, Israel alone ranks among the rankings’ top 30 countries. The July EIU ranking ranks India below Sri Lanka at

43.

- **Networked Readiness Index, 2002-03**

The World Economic Forum, Infodev and INSEAD have developed the Network Readiness Index. While the CID model serves as the reference point, the Information Age Partnership (IAP) from the UK, and the European Foundation for Quality Management (EFQM) version of Total Quality Management model have an important bearing on the NRI framework 2002-03. The WEF has come out with two reports: Global Information Technology Report 2001-02 and Global Information technology Report 2002-03. The earlier report defined Networked Readiness Index as “the potential and the degree of preparation of a community to participate in the Networked World.” The latest 2002-03 report, which has carried out the ranking for eighty-two countries, extends this definition to include the potential and preparation of a community within its encompassing environment. One should exert restraint while comparing the NRI results for 2002-03 to that of the previous year 2001-02. The NRI framework 2002-03 is an evolution of the model used to compute the index last year. Further, the variables used to compute the index vary due to model differences.

The NRI framework, 2002-03, is based upon the following broad parameters which are further divided in to sub-indicators:

1. Environment for ICT offered by a given country or community— market, political/regulatory, infrastructure;
2. Readiness of the community’s key stakeholders to use ICT- individual readiness, business readiness, government readiness;
3. Usage of ICT among these stakeholders- individual usage, business usage and government usage.

According to the report, Finland finishes first, followed by the United States. Singapore, Sweden and Iceland occupy the third, fourth, and fifth places respectively. In Asia: India, with its immense pool of trained IT manpower is ranked 37th, Thailand ranks 41 while China is ranked 43rd.

Objective of the study

The term 'New Economy' is used to explain a return of the growth in the 1990s of various economies despite their low savings rates. The term 'new' suggests something fundamental has changed in how the economy operates and ICT is cited as the catalyst. There is an increasing awareness among policy planners and business leaders on the need to create an enabling environment to support the development and adoption of ICTs across all sectors. The importance of Network Readiness at the State and Central Ministries' level has gained prominence on the public policy agenda of the government alongside the realisation that ICTs can help governments improve performance of their delivery services and enable a better quality of life for their residents.

The study is not linear/ mechanistic but takes a holistic view of not only inputs (finance, manpower, training etc.) and outputs, but also outcome/ impact (social, cultural, economic, environmental and other benefits associated with the consequences of making effective use of information especially inclusion of marginalised sections of the society).

The objectives of the Study are:

- To rank various states in India on the basis of their e-readiness using multi-stage Principal Component Analysis (PCA) (outcome identification) and also to bring out case studies on adoption of e-governance at state levels (impact analysis)
- To rank the Central Government departments/ ministries on the basis of their e-readiness.
- Drafting an Action Plan at the National as well as at the State level.

Methodology

State Level Assessment

The CID Model has been adopted for this study with some modifications, in preference to the Computer System Policy Project (CSPP) and Network Readiness Index (NRI), which envisages placing states in various stages in the following six groups:

- Network Access
- Network Learning
- Network Society
- Network Economy
- Network Policy
- E-governance

The six groups given above have various sub groups as shown below:

Groups	Indicators					
Network Access	Information Infrastructure	Internet Affordability	Hardware and Software	Service and Support		
Network Learning	Enhancing Education with ICTs	Developing the ICT Workforce				
Network Society	People and Organization Online	Locally Relevant Content	ICTs in everyday Life			
Network Economy	ICT Employment Opportunities					
Network Policy	Telecommunication regulation	ICT Trade Policy				
E-Governance	Leadership & Awareness	Govt. Preparedness	Special efforts	E-Services	Infrastructure	Data Systems

The states of India will be ranked using the Principal Component Analysis. The Principal Component Analysis, a tool in factor analytic techniques would be adopted to obtain 'objective' weights to various parameters in obtaining the composite index of e-readiness at the state level. Various attributes such as Network Access, Network Learning, Network Society, Network Economy, etc. need to be combined for this purpose. Each of the attributes is again represented by a large number of indicators which could reflect the status of availability of that particular attribute. For example, network access is characterised through measures of Information Infrastructure, Internet Availability, Internet Affordability, Network Speed and Quality, available Hardware and Software, Service and Support. Again, each of these indicators are measured through a number of sub-indicators; information infrastructure is measured through indicators like teledensity, number of households with telephone connection, businesses with phone number of cellular

services provider, etc. Therefore, measuring the States' level of e-readiness is an involved process.

E-Governance at the state level has come of age. Many state governments have identified key areas for development of e-governance such as land registration, electronic payment of utilities, employment exchange registration, policing and recording crime as well as municipal administration. A few such e-governance schemes will be covered separately as case studies.

Central Ministries/Department level Assessment

The P- cube I- cube model was developed to assess the overall level of e-readiness within the central ministries/ departments. It also measures the various factors that are impacting it. According to this model, various criteria have been evaluated as the factors affecting e-readiness. The six broad criteria identified are IT/e-governance Preparedness, IT Policy, People, IT Infrastructure, Processes and IT Benefits/ competence. These criterion are again divided into sub-criteria which would be both subjective and objective as shown below:

Criteria	Sub- criteria				
IT/e-governance Preparedness	Understanding of e-governance	Importance of IT in functioning of Department/ Ministry	E-Governance Projects		
IT Policy	Action Plan-Status and Responsibilities	Adherence and benefits of IT Action Plan	IT budgeting & spending		
People	Responsibility of the IT function	Basic working knowledge of Computers	IT training and Development Policy	Basic Computer Training Programme	Specialised IT training Programme
IT Infrastructure	Hardware/Software Infrastructure	Networking Infrastructure	Website Infrastructure & Functionality		
Processes	Business Process Re-engineering	Key Processes, their Automation & Integration	Database Automation & Maintenance	Security Mechanics Deployed	
IT Benefits	Benefits observed by implementing IT in processes	Return on investment for implementing IT in processes	Impact of productivity by implementing IT in processes		

Appropriate weights were assigned to each criteria and accordingly scores were calculated for the 69 central ministries/departments studied. The assigned weights essentially define the quantum of impact of the criteria on the overall e-readiness. In order to achieve this, multiple regression analysis was done to identify a dependent variable and then measure the impact of the other variables. This procedure estimates the coefficients of the linear equation,

involving a set of independent variables that best predicts the value of the dependent variable.

The ministries have been categorised into Similar Sized Groups (SSGs) according to variables like, the predominant process (G2C, G2B, G2G) or spread (number of offices), or size (number of employees) or affluence (annual budget allocation for the ministries/departments) that would classify these ministries into distinct, independent and mutually exclusive groups. Cluster Analysis has been used to classify them into three categories: SSG I (less number of employees, few offices), SSG II (large number of employees, less number of offices) and SSG III (large number of employees and large number of offices).

National Level E-readiness – A Backgrounder

Before moving on to the main focus of the study, it would not be inappropriate to succinctly look at the national level e-readiness as a backgrounder. The following sections look at the IT industry evolution, the software sector, hardware sector and the IT policy regime in India.

In recent times, ICTs have displayed their potential capability in repositioning a country's form of governance from Public to Electronic Governance (EG). Electronic Governance (EG) is an emerging trend to reinvent the way the government works in virtual space, digital economy and in dealing with knowledge-oriented societies.

E- governance can be defined as the “application of electronic means in (1) the interaction between government and citizens and government and businesses, as well as (2) in internal government operations to simplify

and improve democratic, government and business aspects of Governance” (Backus, 2001).

The Indian experience in e-government can broadly be divided into two-main phases: the first phase from the late 1960s/ early 70s to the late 1990s, and the second from the late 1990s onwards. In the first phase, efforts to develop e-government were concentrated on the use of IT for in-house government applications with a principal focus on central government requirements such as defence, research, economic monitoring and planning, and certain data intensive functions related to elections, conducting of national census and tax administration. During this first phase, the introduction of IT in the public sector did not result in the automation of many key departmental activities. The ICT revolution began with the government of India strategically deciding to take effective steps for development of information systems and utilisation of information resources. The central government with a view to informatics-led development decided to introduce decision support systems within government ministries and departments, to facilitate planning/implementation of socio-economic programs, during the fifth planning period. The National Informatics Centre under the Electronic Commission/ Department of Electronics was the outcome of this view and was assisted by the United Nations Development Program (UNDP). In the second phase, the implementation of the national IT Task Force and State Government IT policies symbolised a paradigm shift in e-governance policies towards using IT for a wider range of sectoral applications reaching out to a larger number of people in rural as well as urban areas. Moreover, there has been a movement towards a greater input of NGOs and private sector organisations in providing services to the public.

Indian IT Industry

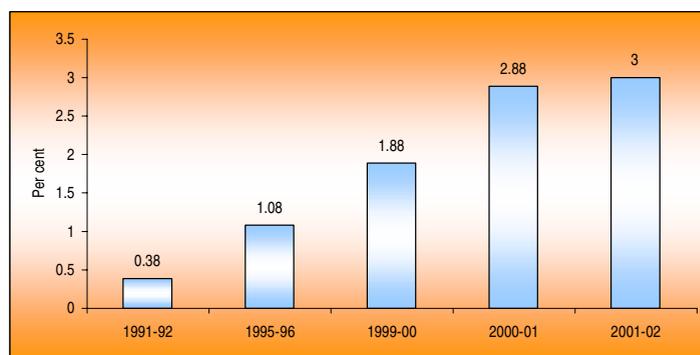
The direct influence of ICT on the country’s competitiveness can be seen in the success of the Indian IT (especially software services) industry. This sector has succeeded not only in achieving global competitiveness but also raising awareness of the benefits of ICT within the country thereby laying the platform for future growth.

Share in GDP

The pace of growth of the IT sector in India has been rapid; the share of IT sector output in GDP has risen to 3 per cent in 2001-02 from a mere 0.38 per cent in 1991-92 as shown

in the following chart.

Figure 1.1: Ratio of IT sector output to GDP

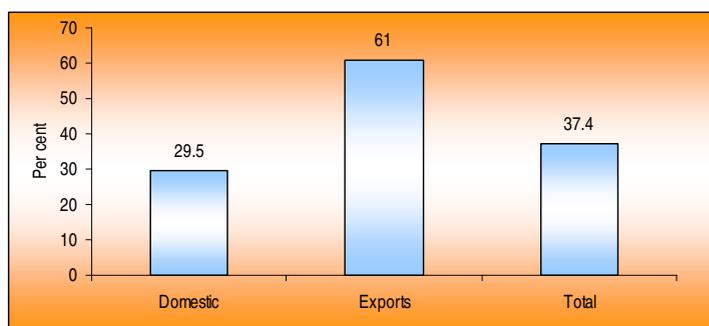


Source: Dataquest, Vol XIX No13, July 15,2001& Vol XX No13, July 15, 2002.

Growth Rate

According to the data provided by Dataquest, over the 12-year period 1990-91 to 2001-02, the annual compound rate of growth of output was 37.4 per cent i.e. the output was doubling every 2.2 years. This rapid growth has essentially been the result of a rapid expansion of exports. During this period, the exports have been growing at 54 per cent per annum. There has been a trend shift in the rate of expansion of IT sector output in 1996-97 driven by these exports. The trend rate of growth of output rose from 23.7 per cent during 1990-91- 1996-97 to 29.8 per cent during 1995-96- 2001-02, whereas the rate of growth of exports rose from 32.5 per cent to 46.6 per cent during these two periods.

Figure 1.2: CARG of Output by Segment, 1990-91 to 2001-02

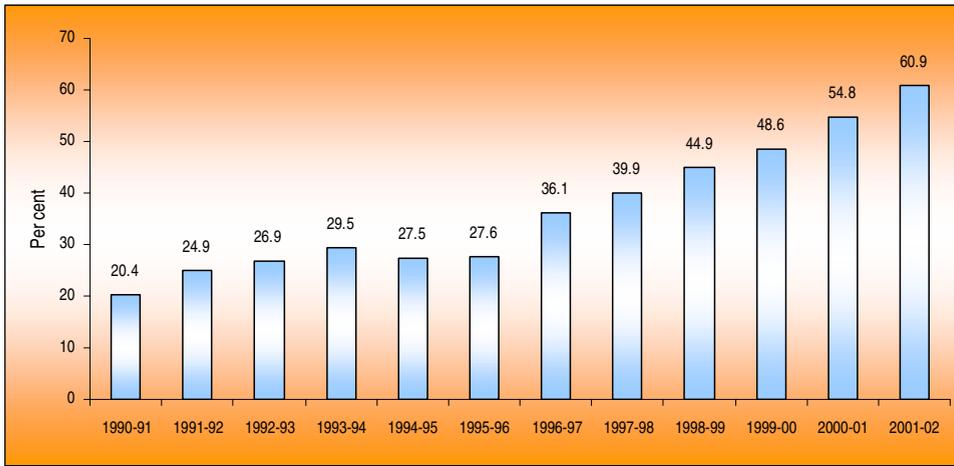


Source: Dataquest, Vol XIX No13, July 15,2001& Vol XX No13, July 15, 2002; GDP figures from Economic survey

Export Component

The share of exports in IT industry output rose from 20 to 28 per cent between 1990-91 and 1995-96 and touched a remarkable 61 per cent in 2001-02.

Figure 1.3: Share of Exports in IT Industry Output



Source: Dataquest, Vol XIX No13, July 15, 2001 & Vol XX No13, July 15, 2002.

Private Sector Participation

The IT sector growth has been driven largely by the private sector on both the supply and demand sides, though government support in terms of IT infrastructure investments, duty free access to hardware for software exporters and zero taxation of export profits played a role. The private sector has accounted for a dominant and rising share of domestic IT spending since 1995-96 and contributed as much as 73 per cent of the total in 2001-02 as compared to 15 per cent and 12 per cent by the government and public sectors respectively. The impact of the software industry success of India is the largest on e-governance when there exists a public-private partnership. In a public-private partnership, the private sector shares financially and administratively in the initiative. The financial success, technological expertise and management skill of the software experience of these enterprises can jump start and propel e-governance in the country. The benefits will be not just economic but both political and societal.

The Software Backbone

The rise of the IT software and services industry (the software industry) in the 1990s represents one of the most spectacular achievements for the Indian economy. Infact, India is the only country in the world to register a growth rate of around 50 per cent in the software industry.

This sector is highly export oriented, has established India as an exporter of knowledge intensive services in the world, and has brought in a number of other spillover benefits

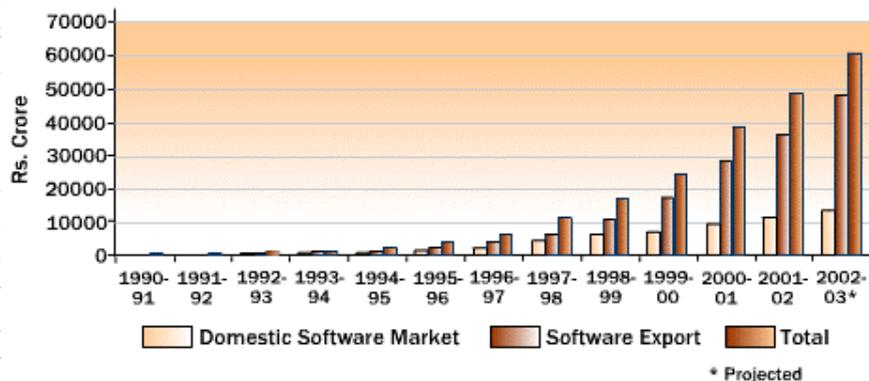
such as of creating employment and a new pool of entrepreneurship.

The growth rate of the Indian software industry which has grown from a modest US\$ 195 million in 1989-90 to \$ 8.3 billion industry by 2000-01, has been substantially higher than that of the global

software industry. In terms of GDP, the figures have risen from 0.59 per cent to 2.87 percent. The export orientation of this industry in India is very evident from these figures. It has earned 75 per cent of its revenue from exports and roughly accounts for about 2 per cent of the US\$ 400 billion global software industry. From a national perspective, software accounts for a 2 per cent share of India's GNP but it has contributed nearly 18 per cent of her exports. The net foreign exchange is smaller because of the considerable component of foreign exchange expenditure on 'on-site' delivery of these services even today.

India's per capita spending on IT is low at \$2.4 and its IT spending is 0.5 per cent of its GDP. In 2001-02, India's total software production (including IT enabled services) was just a little below Rs. 50,000 crore Of this, exports accounted for Rs. 38,000 crore and domestic market a mere Rs. 12,000 crore (NASSCOM).

Figure 1.4: Indian Software Industry 1999-2002



Source: NASSCOM.

India's success in the software sector can largely be attributed to the industry's knowledge and expertise of cutting edge technologies. Indian software companies have constantly striven to stay abreast of global technology trends by embracing technologies that are gaining pre-eminence globally. The main resource that has attracted the industry to the country is the pool of trained manpower generated through investments in human resource development over decades. Subsequently the government facilitated the development of this industry by providing dedicated high-speed data communication links and built up infrastructure in the software technology parks.

Although the magnitude of exports of software from India has grown rapidly over the past decade, the general perception is that these exports comprise low value services. This perception emanates from the fact that in the early years, the bulk of the software export activity of Indian enterprises consisted in lending their software professionals to their clients to deliver their services 'on-site'. It was considered to be a rather low level of skill intensity compared to software product designing and development and has been termed as 'body-shopping' derisively. However, the Indian software industry has come of age in terms of capabilities, sophistication, range of expertise and worldwide reach. Indian companies have progressively demonstrated their technological and project management skills by successfully completing turnkey projects for large companies and are now making conscious efforts to increase exports of high-end consulting with the development of domain expertise and export of packaged software. As a result of this, the proportion of on site exports has begun to come down in India's software exports from 90 per cent in 1988 to 56 per cent by 2000-01. An increasing proportion of India's software is developed 'off-shore' at the home bases of exporters in India and exported. The 'off-shore' development has been facilitated by the improved communication links in the Software Technology Parks (STPs) set up by the government that allow teams of professionals at vendors and clients ends to be in constant touch on a real time basis.

Hardware Scene

Unlike software development, which can begin small and technically simple, efficient hardware output in IT depends on a minimal scale of operation and continuous access to technological innovations largely derived in industrialized countries. Protection doubtlessly was conceived as a way eventually to develop adequate scale but, as in most other cases, has resulted only in inefficient producers without easy access to technology. IT hardware production is yet an

insignificant industry in India, but this situation could change rapidly if the use of Internet and associated computer technology expands to the anticipated levels. Success in hardware will be relatively more difficult than in the software, where government influence has been minimal and where production has relied almost entirely on highly skilled engineers and technicians working in relatively small groups.

As of March 2003, the total installed base of PCs in India was 90 lakh. This figure is expected to grow to 5 crore by 2005. The number of Internet users as of March 2003 was 1.9 crore and is expected to increase to 11.5 crore by 2007. While the US has around 620 odd PCs per thousand population, the figures for India stand at a very low of 9 PCs per thousand population.

In the year 2002-03, it is estimated that the number of PCs sold in India hovered around 20 lakh. More than 60 per cent of the first time PC users in the financial year 2002-03 were driven by the need to access Internet. In recent years, tariffs have been coming down. In the process even though the cost of PCs are becoming comparable or even better than international prices, affordability still remain elusive because of purchasing power parity. As regards the local manufacture/development of IT products, they are still hampered by multiplicity of domestic taxes. This needs to be addressed. Other measures to lower the cost of PCs and increase its utility value include the use of free/open source software, Indian languages computing software and increase of contents relevant to Indian users and Indian languages.

Policy Regime

A policy framework is needed to take care of certain basic factors such as (a) financing requirements; (b) measures to attract private sector investment; (c) measures to improve competition so as to make the system more consumer-friendly; (d) remaining steps to improve regulatory and competitive environment in telecommunication services and products to enable a level-playing field and address the digital divide concerns; (e) promote diffusion of ICT in all socio-economic sectors to enable productivity, competitive strength and better quality of life; (f) a dispute resolution mechanism for tackling disputes between various categories of operators or between operators and the Government; (g) development of trained manpower of desired quality, quantity and skill sets within the country, and, (h) how universal service can be made available within the country. The policy framework must have the resilience to learn from past experiences in order to take timely

corrective actions. The process of formulation of the policy framework must involve the stakeholders including private enterprise and civil society and experts in order to make it a credible and implementable exercise.

The Department of Information Technology is promoting a new Community Information Centres project, piloted in the north-eastern states. The objective is to promote ICTs at the grassroots level, including exchange between government at the grassroots block (sub-district) and district levels. The project will support the establishment of a database of information on topics including drinking water, education, health, population statistics, and court decisions. The highlighted goals are computer awareness and literacy for government workers and a means of connectivity for research and educational institutions. The government has launched an Operation Knowledge programme to meet the shortage of professionals in India. This programme is expected to meet a projected shortfall of 8 lakh software professionals by 2007. The government is also taking steps to triple the intake of engineering colleges in IT – related disciplines from 2003-04.

Telecom Regulation

Regulatory reform in the Indian telecom sector can be seen as a two - step process. One, the establishment of an independent regulator, and, two, the regulatory authority implementing reform on the basis of its policy initiatives. A crucial concomitant of this is the separation of the service provider from the policy maker.

The telecom sector has witnessed some fundamental structural and institutional reforms in the past decade. Table 1.1 summarises the major reforms in this sector from 1991 through March 2002:

Since its inception, the Telecom Regulatory Authority of India (TRAI), has taken up a number of initiatives pertaining to tariff, interconnecting charge and revenue sharing, and has provided its recommendations on the license conditions/ license fee for certain service segments. As in many other industries, regulators of the telecommunications industry have aimed to bring affordable products and services to the public, while at the same time allowing participating companies to make adequate profits.

Liberalisation in the telecommunications sector began in the early 1990s, with licenses being issued to private investors for cellular telephone services. Since then, private investment has been allowed in all telecommunication services. The resulting increased competition from private

service providers, as well as efforts by the regulator to rationalize tariffs and reduce cross-subsidization between local and international rates, has contributed to a significant improvement in India's telecommunications service network and to a reduction in tariffs.

The reduction in telecommunication tariffs is likely to benefit the software sector. This success is in part due to India's abundant supply of relatively high-skilled and low-cost labour; compared with other sectors, software has also been relatively free of barriers to trade and investment. The Government does, however, provide support to the sector, through tax and tariff exemptions, and software technology parks. The Government offers a 60 per cent depreciation on IT products and exemption of "all software used in the IT sector from customs duty" and some concessions on the indirect taxes front also in order to further speed up the spread of information technology. Recognizing the linkages between software and telecommunications, the Government recently merged the Ministries of Information Technology and Communications and has introduced a new Communications Convergence Bill in Parliament.

The Government had earlier announced a 10-year tax holiday for units in STPI/SEZ/EOUs under Sec 10A/10B of the Income-Tax Act. The budget for 2003-04 retains the sops given to software exports. It also extended the exemptions under 10(A) & 10(B) of the Income Tax Act to software firms even after a change of ownership due to a merger. These exemptions were so far not applicable in case of an ownership pattern change which had hindered mergers, de-mergers and acquisitions. The import duty on capital goods used in the manufacture of electronic and telecom equipment has been reduced from 25 per cent to 15 per cent which is expected to give a boost to the domestic hardware industry.

Table 1.1: Major reforms in the telecom sector 1991-2002

Source: Mani (2002), pp 122-8; and DoT (2002), p19

¹ *Readiness for the Networked World: A Guide for Developing Countries*, Center for International Development, Harvard University, 2000.

² *E-Commerce Readiness Guide*, Electronic Commerce Steering Group, Asian Pacific Economic Cooperation (APEC), 2000.