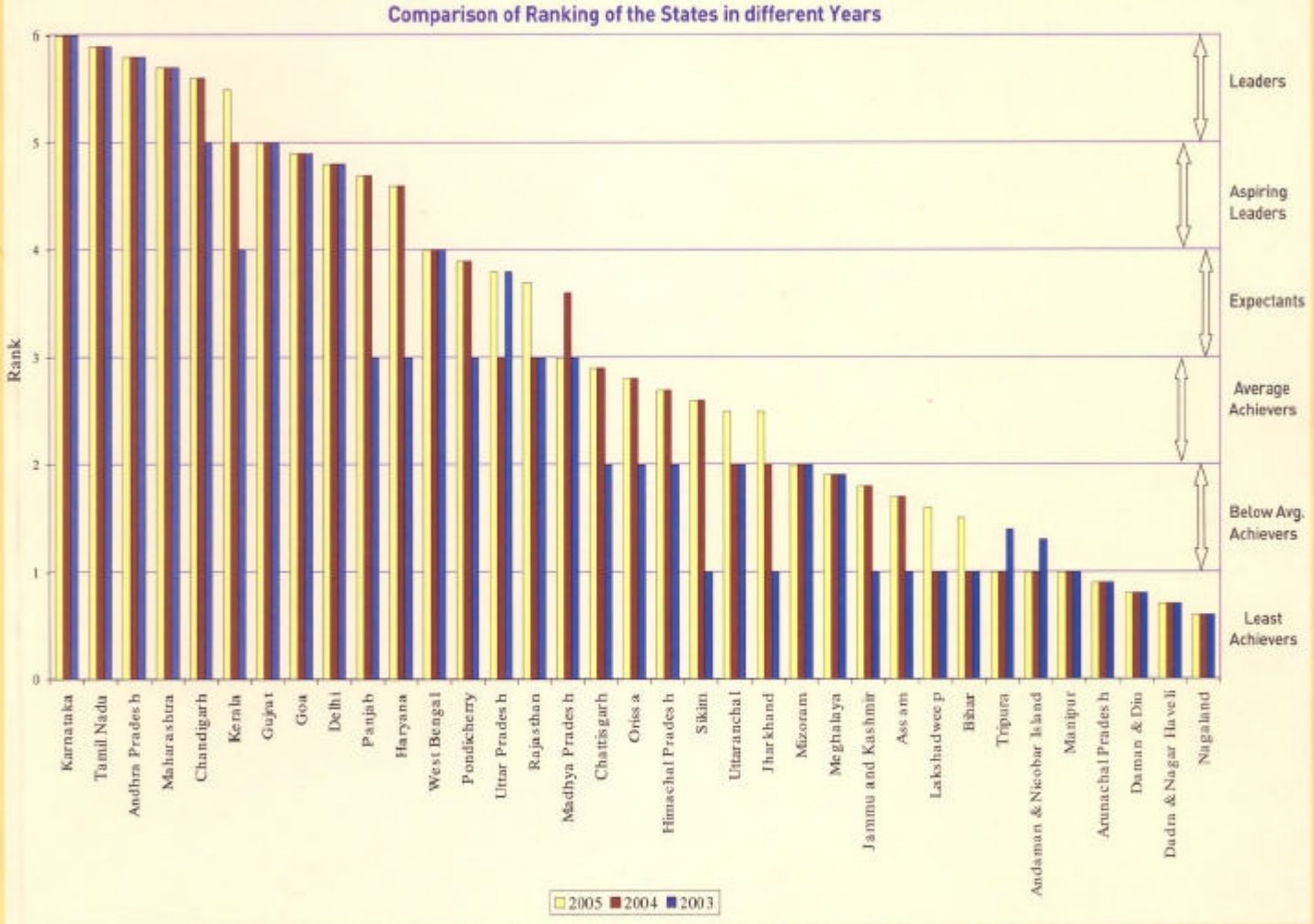
India: E-Readiness Assessment Report 2005

For States/Union Territories



Sen's Approach
- Integration of Marginalised Segment

Brown's Approach
- Intermediate Product Value Maximisation

Sustainability
- Can be Expanded Without Subsidies

Scalability
- Profitable Private Sector Involvement

सत्यमेव जयते

Department of Information Technology
Ministry of Communications and Information Technology
Government of India

NCAER

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INDIA: E-Readiness Assessment Report 2005

For States/Union Territories

January 2007

Department of Information Technology (DIT)
'Electronics Niketan', 6, CGO Complex
New Delhi–110 003, INDIA
Tel: +91-11-2436 0160 Fax: 91-11-2436 3079
E-mail: asegov@mit.gov.in
spsingh@mit.gov.in
website: www.mit.gov.in

National Council of Applied Economic Research (NCAER)
Parisila Bhawan, 11, I.P. Estate
New Delhi–110 002, INDIA
Tel: +91-11-2337 9861-63
Fax: +91-11-2337 0164
website: www.ncaer.org

Cover design & Inside page layout concept: Rakesh Kumar Srivastava (NCAER)

Foreword

We live in a world of constantly evolving Information Communications Technology and its enabling power. While India is leading country in the IT sector globally, the benefits of the IT revolution have not fully percolated to the everyday life of the common man, particularly those in rural areas. Information Communication Technologies (ICTs) can be one of the key enablers of citizen centric services delivery mechanism to create easily accessible interfaces such as one-stop, single-window, automated service delivery outlets or common public service centres, devoid of harassment or corruption, minimising waiting time and inconvenience to the public. ICTs can be used to reduce paper work, improve efficiency, transparency, accountability and expedite the decision making process. ICTs can also be used to break down barriers between departments and bring about 'anytime, anywhere' government services to the citizen.

However, using ICTs is not just a matter of installing hardware and buying relevant software. In order to reap its benefits, its users – government, businesses & citizens - must be e-ready i.e. be able to skilfully exploit the opportunities provided by ICTs. Over the past decade or so, we have seen islands of e-governance initiatives in the country at the National, State, district and even block level. These initiatives have helped these states gain a head start in e-Readiness. Objective assessment of e Readiness helps states evolve proactive policy and robust ICT infrastructure, to make giant strides towards creating information societies and participate in knowledge economy. Tamil Nadu for example, has used such assessments not only to remain a Leader State in the e-readiness index in the recent past but also to improve and retain its ranking within the Leader category from number 3 to 2.

This is the third report on e-Readiness Assessment of States and Union Territories. The first two Reports were well received. Gaining insights from the experience and the feedback, this year's Report brings in a few new dimensions – comparative analysis of state wise ranking over a three year period (2003-2005), state wise output and employment multipliers and state wise strategies based on the above two. The Report also examines, using the case study method, whether the e-Governance/ e-Readiness initiatives have integrated or empowered the marginalized section, the 'value addition' to information, the intermediate product has been maximum, the initiative is sustainable, scalable at sufficient pace and whether the initiative is profitable so that the private sector can become a partner of the development process.

The team of Department of Information Technology worked closely with the team of National Council of Applied Economic Research to conduct this study. The field level data was supplemented by secondary data provided by the state government and Union Territories.

We hope that this Report will be an effective decision support tool for the policy makers and will encourage knowledge sharing amongst the stakeholders at ministries and departments.

Dayanidhi Maran
Minister of Communications & Information Technology
Government of India

Date: January, 2007

Message

The last decade has seen major changes in our capacity to communicate and share information through new developments in Information and Communications Technologies (ICTs). Government investments in ICTs are primarily intended to provide information and services to citizens. At the national level, the National e-Governance Plan (NeGP) is a major initiative of the Government of India to take ICTs to the masses. The vision of the NeGP is to make government services accessible to the common man in his locality through common service delivery outlets and ensure efficiency, transparency and reliability of such services.

The term eGovernance refers to the process of using ICTs for automating both the internal operations of the government and its external interactions with citizens and businesses. The design and development of such complex solutions poses significant challenges. One of the biggest challenges is to ensure that the government, business and citizens are ready to use the technologies effectively. As such continuous assessment of readiness of the different stakeholders to participate in this scenario becomes critical.

The Department of Information Technology has been publishing the e Readiness Report for the past two years to enable informed decision making and policy formulation. The current Report has gone a step further and provides state wise suggestions to help states improve capacities to utilize ICTs.

The Report has been prepared with keen inputs from the different stakeholders and we hope that the efforts put in by the Department of Information Technology and National Council for Applied Economic Research will be of interest not only to the various government department and ministries but also to the business and academic community as well as the public at large.

Jainder Singh
Secretary to Government of India
Ministry of Communications & Information Technology
Department of Information Technology

Preface

Information Communication Technologies (ICTs) have come to play a pivotal role in contemporary societies and even more so in government, which are the biggest collectors, users and disseminators of information. One of the areas in which ICT is having a profound impact is the way Governments function and the manner in which government services are made available to citizens. The need today is to provide citizen-centric governance focused on delivery of high quality public services designed around the needs of the citizen. This involves, amongst other things, strengthening of the district administration and local self government institutions and enabling people and civil society organizations to undertake the delivery of services themselves or assisting them in delivering services, wherever feasible and beneficial.

To achieve these lofty objectives, a comprehensive and continuous assessment of e readiness of state departments and ministries is a critical exercise. The e Readiness Report of the previous two years played a significant role in propelling states to formulate appropriate policies. In the current Report, the comparative analysis of state wise ranking demonstrates the outcome of such policy interventions.

The decision makers may find this year's report even more helpful as it provides the output and employment multipliers for each state. This may help states determine key interventions depending upon the e readiness of the states. We hope that the various stakeholders will continue to participate in the endeavour and provide feedback to enable more detailed exploration of areas of emerging interest in e Readiness and e Governance.

R.Chandrashekhar
Additional Secretary, (e-Governance)
Department of Information Technology
Ministry of Communications and Information Technology
Government of India

Message

The e-Readiness Index of an Indian State reflects its capacity to participate in the global networked economy. Information and Communication Technologies hold the promise of sharpening India's competitive edge by increasing productivity across various sectors of the national economy. It also holds out the promise of bridging the gap between the providers of Government services and their consumers and improves the certainty and quality of service delivery. ICT is also a major driver of economic development by expanding the opportunities for trade.

NCAER's first e-Readiness report, (entitled "India: e-Readiness Assessment 2003") represented an initial attempt at ranking the e-preparedness of India's States, Union Territories and Central Ministries. In the subsequent year, the annual e-Readiness Report 2004 aimed additional recognition as a provider of independent insights into the national effort to bridge the digital divide and on success stories in leveraging ICT for economic development. In 2005, the report incorporates output and employment multipliers of the IT sector at the State level. With three years indices available, the 2005 report also does an inter-temporal analysis of the State rankings.

Top decision makers in the Government rely on the report, which has become an annual feature, in matters of policy formulation. It also encourages various nodal ministries and departments to borrow or share best practices, put in place effective implementation mechanisms and move up in the realisation of value from technology in tune with the opportunities provided. For the investor community, the reports act as pointers to where gap areas and opportunities lie.

New Delhi
January 2007

Suman Bery
Director-General
NCAER

From the Editorial Desk

Independent India's most splendid economic story has been the Information Technology revolution. This industry has charted double-digit growth and continues to grow five times as fast as the global IT services industry. DIT-NCAER's e-Readiness reports, since 2003, have been a significant application of factor analytic modelling in evolving the Networked Readiness Index of Indian States. The index is supposed to reflect the State's capacity to participate in the global and Indian networked economy.

Over the last three years, the index and report have evolved considerably.

The first report dealt with conceptual issues involved in developing the e-Readiness Index of Indian States. The report also, through case studies on e-Governance applications at the State level, looked at the role of technology in bridging the gap between providers of government services and their consumers, in terms of removal of uncertainty and improvement of quality of service delivery in a transparent manner.

The second report expanded the framework of case study analysis. Using "Sen's empowerment of vulnerable groups of the society" framework, the report analysed whether the State specific e-Governance applications reached the un-served and/or under-served citizen. However, an e-Governance application that serves the target audience but does not utilise the maximum potential of technology or value of information, is again a sub-optimal one. Thus, Brown's Framework was used to analyse the same. In addition, analyses of financial IRR and economic IRR of e Government applications also formed an integral part of the report and thus, the profitability component was added to the conceptual analysis of case studies. The parameters were also revised in the light of suggestions received from various State governments without altering the basic model - Principal Component Analysis - to include Ground level realities into the Index.

The current report has several interesting and useful analyses. First, as an inter-temporal analysis of issues related to IT is an interesting facet, a trend analysis of the Composite Index and sub-indices of e-Readiness of Indian States has been attempted. Second, an analysis of the output and employment multiplier effects of the IT sector not only at the national level (which was our staple analysis in the previous two reports) but also at the State level is presented. For this we consulted the Input-Output specialist, Prof. M.R. Saluja, in order to understand the impact of IT sector in both the "developing" and "developed" States of India. The IT sector's significantly higher Employment Multiplier effects in "developing States" and Output Multiplier effects in technologically advanced states reinforces the different role IT plays in developed and developing regions in bridging the digital divide. This year's case studies look at how Public Private Partnership models emerge as the common factor of successfully launched, scaled up, e-Governance applications without any appreciable gestation period. The report also delineates factors that distinguish successful initiatives from the not so successful ones such as the ability of the State to learn from other States' success stories; keenness to leverage the existing e-Governance applications; realisation of the breadth and depth of e-Governance applications from maintaining the data base of land records to delivery of public services in remote areas, to governance of municipalities to having applications that have the reach in the entire State to those restricted with reaches at the district and block levels.

To sum up the sojourn till date has been interesting and exciting, revealing various insights on possible solutions to various issues confronting the use and potential of IT in governance in India.

New Delhi
January 2007

R.Venkatesan

Acknowledgements

The comprehensive study of e-Readiness within the specified time frame would not have been possible but for the cooperation of a number of people and organisations.

The Department of Information Technology team guided by Secreatary, Shri. Jainder Singh and consisting of Shri. R. Chandrashekhar, Additional Secreatry, Shri. S.P. Singh, Senior Director DIT, and Ms. Vineeta Dixit, Consultant, NEGP, have put in a great deal of effort to give this study a final shape.

The Department of Information Technology appreciates the valuable inputs and suggestions received from the IT Secretaries of various states and Union Territories.

We thank the NCAER team led by Mr. R.Venkatesan - Project Leader and Dr. Wilima Wadhwa - Joint Project Leader; Prof. M.R. Saluja - Input – Output Analysis Specialist, Dr. Bibek Ray Chaudhari, Ms. Rupa Malik - Project Co-ordinator, Mr. Sujit Basu and Ms. Kanika Kalra for their efforts in bringing out the state-level ranking and case studies of e-governance initiatives. We also thank to Mr. Udayan Namboodiri for his editorial comments and suggestions.

We thank the IT Secretaries of all State Governments and Union Territories for their timely responses which made the completion of this mammoth exercise possible within the allotted time.

Last of all, we express our indebtedness to all those who have not been explicitly mentioned above but have been working ceaselessly behind the scene and have made a substantial contribution to this exercise.

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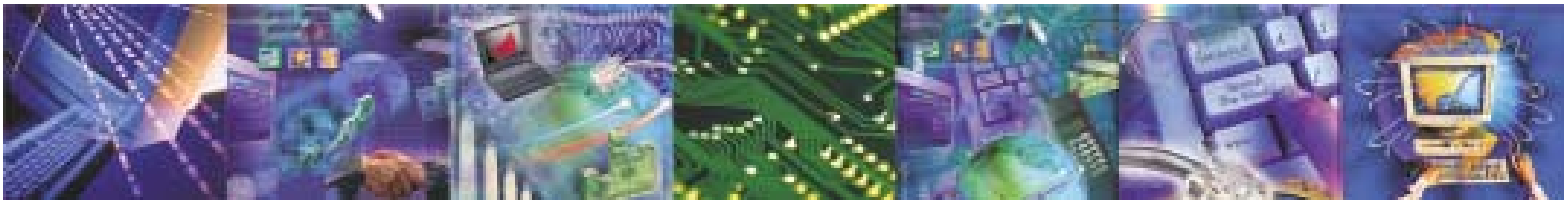


Executive Summary

- ICTs are increasingly being recognized as essential tools of economic development.
- The contribution of ICT can be viewed at two different but interrelated levels- ICT growth and ICT diffusion.
- Unlike old technologies, which are more demand driven, ICT is more supply driven and leaves greater scope for diffusion.
- The government is very much proactive in the context of improving ICT performance in the country. The state governments are also actively participating in the process with direct policy level competition.
- E-Readiness study has increasingly become popular and a platform to compare different level of state development.
- ICT's role is relevant for both for "developing" and developed states as revealed in the findings of the study.

Unique Features of the E-Readiness Report, 2005

- Output and employment multipliers - state wise for major states.
- Comparative analysis of state level rankings over the three-year period since inception of the e-Readiness in India.
- State level strategies based on the insights from the above two-multipliers and comparative analysis.

For the first time, output and employment multipliers of the key states in India for the software, hardware and ICT composite segments have been calculated to assess the catalytic effect of ICT on economic development in these states. The second unique feature of this report is the comparative analysis of the e-readiness status of Indian states over a three-year period (2003 to 2005). This helps us not only to evaluate but also to monitor state performance. These rankings help us to understand whether states have adopted strategies/action plans to improve their network readiness index. The report also brings out the key factors that states should address to tune up their e-readiness rankings.

Output and Employment Multipliers

The multipliers of the states for the software sector have been derived from the all India multiplier figures of the software sector using the ratios of employment/output and input/output. The table below shows the output and employment multipliers of a few major states of the country.

Software sector-Output Multiplier and Employment Multiplier

State	Output Multiplier	Employment Multiplier
Delhi	1.41	2.35
Chandigarh	1.92	1.49
Maharashtra	3.22	0.32
Andhra Pradesh	1.15	3.87
Karnataka	1.45	0.23
Kerala	1.64	2.56
Tamil Nadu	1.46	0.67
Punjab	1.11	2.27
Haryana	1.62	2.00
Rajasthan	1.42	5.40
Uttar Pradesh	1.31	1.43
West Bengal	1.41	2.18
Orissa	1.38	4.34
Madhya Pradesh	1.84	5.45
Gujarat	2.25	1.30

- The output multiplier for the software sector varies from 1.11 to 3.22 including the unitary impact of the software sector.
- The employment multiplier for the software industry is in the range of 0.23 to 5.45 man-years per lakh of output in 2001-02 prices.
- In "developing" states like Orissa, Madhya Pradesh, Rajasthan etc., the employment multiplier is high whereas the output multiplier is low, thus, indicating the existence of low technical applications and high involvement of labour especially in the IT enabled services in the state.

- The "horizontal" diffusion level of ICT in these developing states would be far higher than the developed states where the output multiplier is high indicating higher "vertical" diffusion and the employment multiplier is low.
- In developed states like Maharashtra, Gujarat etc., the vertical linkages are higher due to the use of high technical input. Thus, information technology plays a unique role in both advanced states as well as "developing" states.

To arrive at the composite ICT sector's output and employment multipliers, we used a weighted average of the output multiplier of the hardware sector and the software sector in key states. The weights being the ratio of national output of the hardware and the software sector.

Output Multiplier and Employment Multiplier for ICT Sector

	ICT Sector (Hardware + Software)	Hardware Sector	Software Sector
1. Output Multiplier	2.3	2.5	2.2
2. Employment multiplier (man-years per rupees lakh of output)	0.36	0.18	0.38

For example, per NASSCOM data, the total turnover of IT sectors had increased from USD 7.09 billion in 2000 to USD 28.4 billion in the year 2005, a CAGR of 32 percent since FY 2000 in current prices. Thus the employment generated in the year 2005, since the beginning of the year 2000 using composite employment factor for ICT sector 0.36 is 3.45 million man years. Thus, the ability to create employment by the ICT sector indeed is quite high as brought out by the above illustration.

For the ICT sector as a whole, the output multiplier is 2.3 viz Rs 2.3 lakh increase in output of the economy for every Rs one lakh increase in output of the sector under consideration including the unitary impact of this sector. Similarly, the ICT sector creates an employment of 0.36 man years for every Rs one lakh of output of the sector.

Thus, we see that ICT can make leapfrogging possible; it does not accentuate differences but encourages economic development. The states have comparative advantage; developed states like Maharashtra, Tamil Nadu etc can attract a pool of technical talent whereas "developing" states like Rajasthan, Madhya Pradesh can offer opportunities for for employment associated with IT. Thus, ICT has a role to play in both technically advanced as well as developing states.

Framework of Analysis for E-Readiness Index of the States in India 2005

This is based upon the following premises:

- There are three important stakeholders to consider in the development and use of ICT: individuals, business and governments;
- The degree of usage of ICT by (and hence the impact of ICT on) the three stakeholders is linked to their degrees of readiness (or capability) to use and benefit from ICT
- There is a general macroeconomic and regulatory environment for ICT in which the stakeholders play out their respective roles.

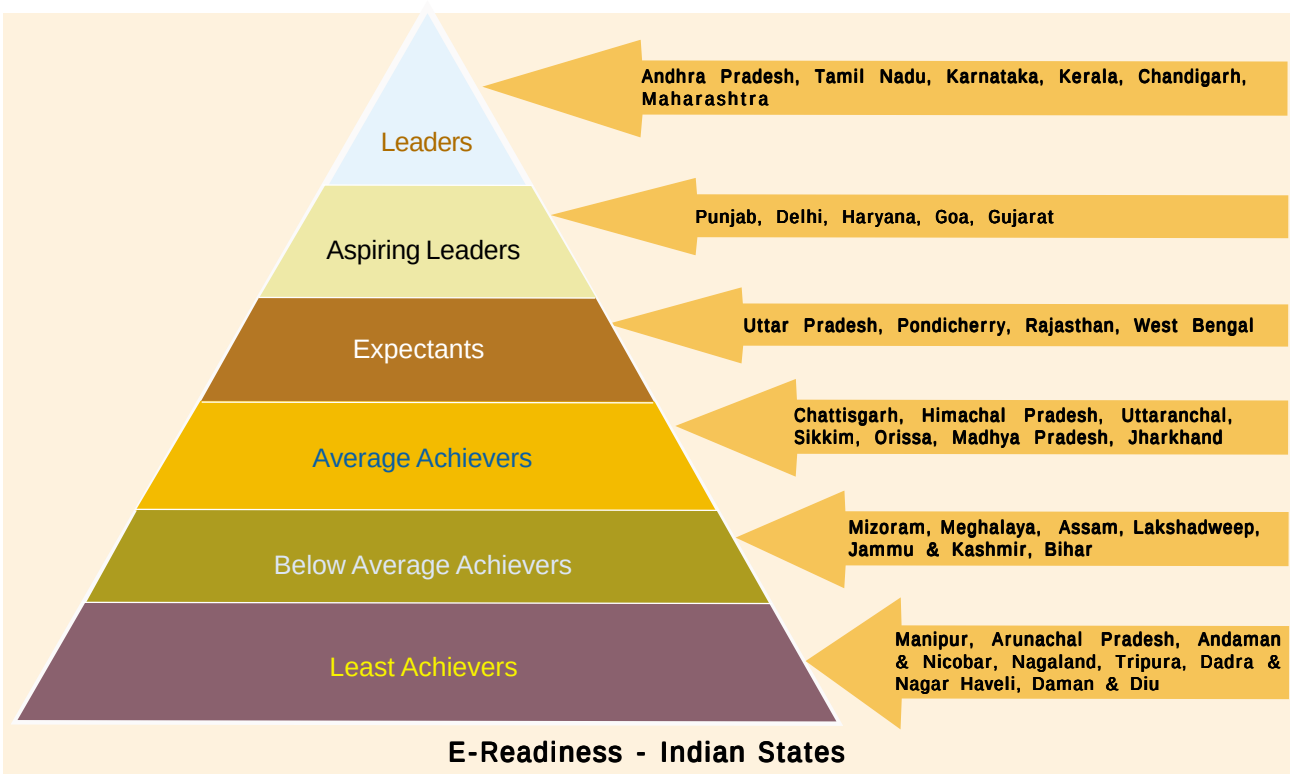
The e-readiness index developed by us is composed of variables that fall into three broad categories 'Environment', 'Readiness' and 'Usage'.

Methodology

We measure e-readiness of the states through an empirical model using Principal Component Analysis (PCA). This is a multivariate analytical tool. PCA helps in determining the most important variable or a limited number of variables from a given set of explanatory variables. This approach develops a composite index by defining a real valued function over the relevant variables objectively. We have used a multi-stage Principal Component Analysis to construct the e-readiness index of the states. The following steps were used in constructing the e-readiness index:

1. First we used PCA to combine the indicators and construct indices for each sub-group.
2. In the second step we combined these sub-group indices (using PCA) under each group index to arrive at next level of aggregation (Environment Index, Readiness Index and Usage Index).
3. Finally, we constructed the aggregate E-readiness Index by combining the Environment, Readiness and Usage indices (again through PCA).

The PCA analysis generated the weights to be assigned to the indicators of e-readiness optimally. The model has



E-Readiness - Indian States

assigned almost equal weights to all three indicators indicating that they are almost equally important (with environment having a slightly higher relative weight) in the overall index of e-readiness.

Sub-Index: Environment

Competitive market environment, education and access to communication facilities significantly affect the environmental readiness of the states. Competition among players in the ICT sector gives the consumers better quality products at affordable prices. Education makes people capable of harnessing the advances in technology and access to communication facilities aid in enhancing the e-readiness of the states.

The categorisation of the states based on "Environment sub-index" shows that the number of states in the level 6 category has significantly reduced in comparison to last year. This implies that states have taken initiatives to provide a sound environment for ICT development.

Sub-Index: Readiness

Variables of significance for individual readiness primarily depend on the level of education of individuals. Here again, education emerges as an important variable. Thus, the state governments should lay special emphasis on enhancing expenditure on education. Government readiness depends significantly on availability of on-line training programmes for officials and provision for usage of ICT as a governance tool.

Sub-Index: Usage

Income is a significant variable in the Usage sub-index. A state may have state of the art facilities, a number of institutions imparting ICT education, but it is ultimately income of potential users that determines the usage of ICT across states. As far as the government is concerned, in all three categories, the greater the engagements of the state government in this sector the better the e-readiness of the state.

The categorisation of the states based on "Environment sub-index" shows that in this category more states are in the above average level (Level 4) than the other two categories. However, seventeen states are still below average. The relative standings of all three categories show that there is a lot yet to be achieved in terms of balanced regional development of ICT.

Comparison of Ranking

For the last three years, states have been ranked according to their e-readiness status. This yearly exercise has assumed importance over the years as the Government of India accords considerable emphasis to this report as

a stock taking mechanism, to understand the situation regarding e-readiness or preparedness of the states.

While comparing the rankings for 2004 and 2005, it can be observed that the states of Bihar (up four places), Jharkhand (up four places), Rajasthan (up six places) and Uttaranchal (up seven places) are the states, which have significantly improved their positions in the last year.

- The state of Bihar has significantly improved in indicators representing market and infrastructure environment, business and individual readiness.
- Jharkhand, has done exceedingly well and has improved its ranking through good performance in political & regulatory and infrastructure environment indicators, government and individual readiness indicators.
- Rajasthan a state which is performing well in terms of income growth and poverty alleviation in the last few years has significantly improved its ranking in the year 2005 over 2004. Factors responsible for such changes are political and regulatory and infrastructure environment indicators, government readiness indicators and individual and government usage indicators.
- Uttaranchal the state with the greatest improvement in ranking between 2004 and 2005, has done well in political and regulatory and market environment indicators, government and individual readiness indicators and business and government usage indicators.

It is clear that political and regulatory, government readiness and government usage are indicators that have helped most of these states to improve their rankings in terms of e-readiness between 2004 and 2005.

Validation by Case Studies

The case studies examine the "impact/outcome" of the ICT initiatives. These have not been restricted to simply performance evaluation of the ICT projects but also examine

- whether the state was able to bring about effective process reengineering,
- whether ICT was a catalyst in bringing about changes in the infrastructure supply
- whether ICT was a catalyst in bringing about changes in the institutional framework
- whether there were any legislative changes made
- whether the project brought about any effective change in policy as a result of increased awareness in demand from institutional stakeholders.
- whether there was a reasonable spread across income groups as well as remote less developed geographical regions

In these case studies we also examine whether the e-governance/ e-readiness initiatives have integrated or empowered the marginalized sections (Sen's Approach); whether the 'value addition' to information, the intermediate product has been maximum (Brown's Approach) and whether the initiative is sustainable, scalable at sufficient pace and whether the initiative is profitable so that the private sector can become a partner of the development process

Indicators of Significance for the States: An Aggregate Analysis

Based on the quantitative analysis, indicators that emerge as important and should be given priority by the states while addressing e-readiness issues are:

Political and Regulatory Environment

- Proportion of policies taken up for e-governance
- Existence of cyber laws in the state

Infrastructure Environment

- Access to social and educational infrastructure. Factors that are important here include: average distance in kms to the nearest primary school, post office, public telephone booths, computer training centers, college, internet kiosks, medical store etc., All these variables turn out to be crucial..

Individual Readiness

- Household penetration of computers, telephones and mobiles is a very important variable of individual readiness. Training of users in government owned computer kiosks has been a significant factor in the north-eastern region.

Business Readiness

- Setting up of IT parks and increasing the number of IT companies This matches with the findings that competition matters. However, in the case of ISP and cellular limited competition is only possible due to technological constraints such as minimum number of subscribers to be viable per operator etc

(natural market concentration rider for stable long term operators)

- Incentive regimes for IT companies
- Dedicated infrastructure for IT companies

Government Readiness

- Expenditure on education since education of users is an important ingredient
- Use of ICT in government functioning is critical, for example, use of ICT in public delivery systems enhances government usage significantly.
- Number of government officials undertaking/ undertaken online training programmes
- States that take initiative in opening up of technical colleges gain a competitive advantage over other states in the ICT segment

Government Usage

- Number of e-governance projects undertaken by the state government as a regulator and provider of infrastructure plays an enabling role. While govt as probably the largest single user can help expand the market.

State Level strategies

The state level strategies for a few states are discussed succinctly in the table below:

State	Bottleneck Parameters	Sub-Indicators	Key Indicators to be tackled	Policy Changes	Action Plan
Andhra Pradesh	Environment	Market Infrastructure	Competition in the telecom sector Distance from the nearest primary school college internet kiosks etc	– Market Environment needs to be improved – Impetus to ICT education needs to be provided	– Increasing the density of internet kiosks
Karnataka	Environment	Political & Regulatory	Proportion of policies for ICT	Only state to have Secretary level official heading the e-governance wing. -Needs to institutionalize the set up	– SeMT (e-governance mission teams) needs to be set up if not already in place – Institutionalise PPP model in e-governance activities
Chandigarh	Readiness	Individual	Total Number of – engineering students to total technical students – MCA Students to technical students – B.Sc Computer Science/ technical students	Provide impetus to higher education	Give financial support to colleges and provide incentives to colleges to increase the no. of seats in technical courses
Delhi	Environment	Political & Regulatory	Proportion of policies for e-governance/ security -	- Proactive political & regulatory environment -need of the hour Impetus to education	- ICT policy revised-section on regulatory & legal policy - Have a supplementary budget for e-governance

State	Bottleneck Parameters	Sub-Indicators	Key Indicators to be tackled	Policy Changes	Action Plan
					projects - Introduce transparent policy for PPP for e-governance projects
Delhi	Readiness	Individual	- No. of engineering/ technical students - Proportion of policies for ICT readiness		
Haryana	Readiness	Government	Government expenditure on secondary education	- Provide impetus to higher education	- Increase outlay in annual budget for secondary education - Give financial support to colleges & provide them incentives to increase the number of seats available in technical courses
Goa	Readiness	Business	- Employment in IT cos/total no. of IT parks - ICT exports to total exports	- Develop a policy environment for introduction of ICT applications - Introduce a policy to facilitate ICT export from the state	- Give concessions to industries for ICT activities - Provide incentives like tax concessions to attract investment to build IT parks - Set up internet kiosks to facilitate accessibility
	Usage	Government	- Status of accessibility to information & services to citizens - Proportion of policies taken up for ICT usage		
Gujarat	Readiness	Individual	Percentage of total households with computers	- Fiscal incentives for computer manufacturing in the state - Special budget allocations for secondary education - Outlay in budget for ICT awareness - Policy for setting up govt kiosks to spread awareness	- Loans at low interest to citizens for purchase of computers - Financial support to colleges & incentives to increase seat in technical courses - Concessions to industries/companies for ICT activities - Increasing the density of internet kiosks
		Government	Government expenditure on secondary education		

State	Bottleneck Parameters	Sub-Indicators	Key Indicators to be tackled	Policy Changes	Action Plan
Uttar Pradesh	Environment	Infrastructure	Distance from the nearest computer training center, internet kiosks etc	- Specific policy for introduction of CICs - Specific budget allocation for secondary education & incentives for higher education etc - Introduce a policy to facilitate ICT exports from the state	- Open internet kiosks which can be set up in schools, markets etc & provide internet & training facilities like CICs in the north east - Give financial support to set up engineering colleges - Give concession to industries/companies for ICT activities
	Readiness	Individual	Total number of engineering students to total technical students		
Rajasthan	Environment	Infrastructure	Distance from the nearest college, medical center etc	- Continue the progressive steps till date - Proactive policy by the government for infrastructure development	- Give financial support to private entrepreneurs for setting up institutes for higher education - Increase the density of internet kiosks
Chattisgarh	Environment	Infrastructure	Distance from the nearest post office public telephone, computer training centre, etc	- Special budget allocation for infrastructure development - Provide impetus to higher education - Address issue of IPR in ICT policy	- Give financial support to private entrepreneurs to improve the density of colleges & equity in distribution of education - Introduce a section on security & legal policy in state ICT policy

Key Findings

- Our analysis of the e-readiness of the states reveals that the southern states like Andhra Pradesh, Karnataka, Tamil Nadu and Kerala have remained leaders over the three-year period, while the northern states of Chandigarh, Haryana, and Rajasthan have shown vast improvements. Apart from these, Sikkim from the north eastern region has done exceedingly well
- The output and employment multipliers calculated for key Indian states show that ICT plays an important role in states, irrespective of their stage of development. Developing states like Rajasthan and Madhya Pradesh have a high employment multiplier and low output multiplier indicating the existence of high involvement of skilled labour in the IT services area, whereas the high "vertical linkages" in the developed states of Maharashtra and Gujarat is shown by the high output multiplier and low employment multipliers.
- Another important observation is that old technologies are demand driven and take time to penetrate whereas new technologies like ICT are more supply driven in the sense that the rate of diffusion is very high in this technology in both developed and developing regions and thus proactive role of government in all states will yield positive results in economic development. Therefore, there is greater scope in these technologies for diffusion agents to influence the diffusion process, implying that the outlay for the ICT sector should be increased substantially in order to achieve maximum benefits of ICT.

Introduction

CHAPTER ONE

Introduction

Information and Communication Technology (ICT) is increasingly recognised as an essential tool of development – a tool which empowers the poor by enhancing skills, increasing productivity and improving governance. The success of ICT–enabled development (or e-Development) is measured not only by the diffusion of technology, but also by advances in development itself.

The contribution of ICT can be viewed at two different but interrelated levels: ICT growth and ICT diffusion. The former refers to the contribution in output, employment, export earnings, etc., resulting from production of ICT related goods and services that are limited to just one segment of the economy. The latter refers to IT-induced development through enhanced productivity, competitiveness, growth and human welfare resulting from the use of this technology by different sectors of the economy and society.

International research findings in the context of developing and developed countries reveal that unlike old technologies (radio, television, etc.) which are more demand driven, ICT is more supply driven and leaves greater scope for diffusion agents (Non-Government Organisations or NGOs, Government, private sector and other actors) to influence the diffusion process. Firstly, unlike earlier technologies, investment in the Internet, personal computers, etc. essentially complements investments already made in communications technologies like satellites, telephone and cable TV networks. Secondly, newly developed software technology in India has replaced the requirement of broadband and thus provides full connectivity in rural areas. Thirdly, ICT is multi-user by nature, which, in turn, leaves scope for Internet kiosks, Internet cafes and Community Information Centres (CICs), providing access to many.

In India, the IT sector has not only grown in size but also complexity. Indian States resemble little nations. So, it is important to take regular stock of e-Readiness at the country and State/ Union Territory levels to ascertain the status of underlying infrastructure, human resources, policy regime, environment climate, etc. and arrive at the steps needed to be taken to optimise the potential. Before we introduce our e-Readiness methodology, it would be instructive to look at the various e-Readiness assessment models used elsewhere.

1.1 Literature Review

Various e-Readiness assessments have been carried out over the past few years. 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. The report analyses a country's e-Readiness on the following dimensions: connectivity (infrastructure, access and pricing), e-Leadership (Government policies and regulations), information security (intellectual property, privacy, electronic signatures), human capital (ICT education, available skilled workforce), and e-Business (competition, political and financial stability, foreign investment, financial infrastructure) climate.

- **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'. It does not examine any given country, but presents a tool which is generally applicable. Measurements are divided into five categories: Infrastructure, Access, Applications and Services, Economy and 'Enablers' (policy, privacy, security, and ubiquity).

The report provides a series of 23 questions. For each question, the users choose from a set of answers, which represent four progressive 'stages' of development. 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.

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

The Center for International Development (CIDS) at Harvard University developed this guide for Government policy makers to assess the state of networked readiness of a community. 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 (telecommunications and trade) policy, ICT training programmes, diversity of organisations and relevant online content. The guide rates the 'stage' a community is in for each of the 19 categories. Descriptions are given of the parameters it has to meet in a particular stage. The Guide does not offer prescriptions for improved readiness.

- **The Economist Intelligence Unit e-Readiness Rankings, 2006**

The Economist Intelligence Unit's (EIU) new e-Readiness model tallies scores for 68 nations across six (Connectivity and Technology Infrastructure, Business Environment, Consumer and Business Adoption, Social and Cultural Infrastructure, Legal and Policy Environment, Supporting e-Services) categories. These include a total of 100 separate quantitative and qualitative indicators. Each variable in the model is scored on a scale from one to ten. Where possible, the variables rest on quantitative, statistical data while others reflect qualitative assessments by the EIU country analysts. The EIU e- Readiness Ranking for 2006 places India at 53rd (49th in 2005) and 10th in the Asia-Pacific region.

- **APEC's (The Asian Pacific Economic Co-operation) e-Commerce Readiness Assessment**

The major goal of this tool is to help Governments develop their own focussed policies, adapted to their specific environment for the healthy development of e-Commerce. Six categories of variables are examined to assess readiness:

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-in business, Government, homes
4. Promotion and facilitation-industry-led standards.
5. Skills and human resources-ICT education, workforce.
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. Hence, the assessment is based on opinions of individuals. Scores are given for each category and no overall score is given. The guide does not provide a comparative assessment of nations.

1.2 Analytical Framework for the Report

The Networked Readiness Index (NRI) Framework 2004-05 used in this Report is based on the following broad parameters that are further classified into sub-indicators:

Environment for ICT offered by a given country or community-market, political/regulatory, infrastructure.

Readiness of the community's key stakeholders to use ICT-individual readiness, business readiness, Government readiness.

Usage of ICT among these stakeholders- individual usage, business usage and Government usage.

This Framework has evolved from the *e-Readiness Report* 2003 and is similar to the one used in the *e-Readiness Report 2004*. Feedback based on interactions and discussions with the various stakeholders reveal that the methodology is now acceptable to them. Hence, it was applied this year as well. But this report, unlike the former, not only gives the e-Readiness Index but also analyses the progress over the last two years. In the process it helps policy planners identify the areas of improvement.

The Framework has been used because of its potential not only to evaluate a State's relative development in the

use of ICT, but also to facilitate a better understanding of its strengths and weaknesses in the area. Principal Component Analysis (PCA) has been used to arrive at the Composite Index. PCA is a way of defining patterns in data, and expressing the data in such a way as to highlight their similarities and differences. Since patterns in data can be hard to find when it is of a high dimension and the luxury of graphical representation is not available, PCA prevails as a powerful tool for analysing data. The other advantage of PCA is that once these patterns have been found, the data can be compressed, i.e., its dimensions can be reduced without much loss of information. This technique is used to arrive at a Sub-Group Index from the indicators in each group, as well as an Aggregate Index of groups for every state.

We complement the quantitative approach of the PCA with a qualitative analysis of several case studies. Through case studies we examine whether the e-Governance/ e-Readiness initiatives have integrated or empowered the marginalised sections (Sen's Approach); whether the 'value addition' to information, the intermediate product, has been maximum (Brown's Approach) and whether the initiative is sustainable, scalable at a sufficient pace and, finally, whether the initiative is profitable so that the private sector can become a partner in the development process.

1.3 ICT and Economic Development

The Indian Government, in its development role, has been performing four principal responsibilities related to ICT. First, it began carefully nurturing its booming ICT industry. Indian has emerged as a powerful global player in the ICT market. Since the 1980s, overseas majors have been sourcing software and services from India. The effort is supported by industry groups like NASSCOM (National Association of Software and Service Company), MAIT (Manufacturers' Association of IT Companies), CII (Confederation of Indian Industry) and CSI (Computer Society of India). ICT has displayed remarkable resilience. Despite a downward trend in global spending, it recorded 26 per cent growth rate and emerged as the fastest growing segment of the Indian economy in 2002-03 with a turnover of $12.7 billion and exports touching an all time high of $10 billion. As per NASSCOM estimates IT/ITES exports revenue was $17.7 billion during 2004-05.

Second, substantial policy changes have been made in the ICT/telecommunications environment to increase the reach and potential public access to resources. India made a head start in the liberalisation process in its telecommunication sector in 1991. The New Telecom Policy, 1999 and the amended Telecom Regulatory Authority of India Act, 2000 cleared hurdles for a level playing field in telecom and its regulation. The announcement of the Internet Service Provision Policy in 1998 marked the demise of State monopoly over Internet provision. The New Telecom Policy simulated the development of telecom, especially in rural areas. Almost every State now has its own IT legislation.

Third, the Government gave Research and Development (R&D) a new thrust. While the Centre for Development of Advanced Computing (C-DAC) developed Param Padma, the largest tetra- scale supercomputer in Asia (outside Japan), the Indian Institute of Science took active interest in developing the Simputer. Efforts at the National Centre for Software Technology (NCST) focussed on developing low cost information processing and creating R&D institutions to develop tools and technologies for Indian language support. Other leading centres of excellence in ICT include: The Technology Information Forecasting and Assessment Council (TIFAC), Software Technology Parks of India (STPI), Technology Development Council (TDC), National Informatics Center (NIC) and the Department of Electronics Accreditation of Computer Courses (DOEACC).

The fourth and most important Government role has been in the applications of ICT to achieve good governance. As State Governments gear up to appear SMART (Simple, Moral, Accountable, Responsive and Transparent) in India, they seem to increasingly turn to ICT to enable e-Governance. ICT helps in overcoming cultural barriers, bridging economic inequalities and opening up intellectual pursuits to the benefit of common man. At the same time it promotes openness, accessibility, accountability, connectivity, democracy and decentralisation, which are attributes essential for effective social, economic and political development. Better delivery of services to citizens, improved interaction with business and industry, citizen empowerment through access to information and more efficient governance through access to information are the different ends achieved by the Government.

As a result, this sector has not only grown in size in India but also in complexity. India's share in the global market for outsourcing software grew from 11.9 per cent in 1991 to 18.5 per cent in 1999, reflecting a total market growth of 55 per cent[1]. However, the importance of e-Readiness cannot be gauged only by technology penetration or average Internet access. Returns from e-Readiness are realised when countries use ICT to boost economic and social development. The diffusion of ICT across India has been encouraging. Urban India is relatively well connected to multiple knowledge gateways. However, rural India needs impetus. Though ICT infrastructure in rural India is steadily growing as part of recent State - sponsored initiatives, its impact on human development would depend much on the efficacy of multifaceted interlinkages across State, market and civil society institutions in rural India.

In rural India, access to ICT is provided using shared public access mode in the form of Info-kiosks, a rural version of cyber cafés available in cities. Info-kiosks act as the information and communication interface for all stakeholders. They provide basic communication facilities like Internet connection and telecommunication services, besides other computing services to the villagers. However, to tap the maximum potentials of ICT for holistic development and to ignite the rural development process with a knowledge revolution, Info-kiosks need to be equipped with not just robust and reliable connectivity and electrification, but also with appropriate content and applications, efficient human resources and creative management.

1.4 Macro Analysis of the Indian IT sector

1.4.1. Growth of the Indian IT Industry and Expected Industry Size

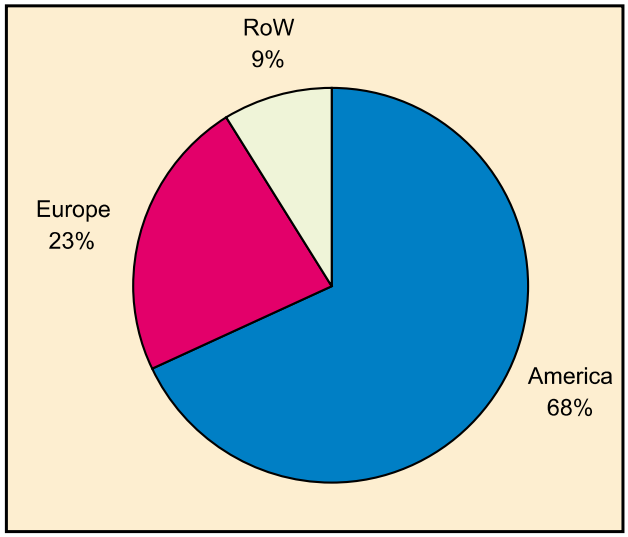
The NASSCOM Strategic Review, 2006 indicates that the Indian IT-ITES (Information Technology Enabled Services) sector continues to chart double-digit growth and is expected to exceed $36 billion in annual revenue in financial year 2006 (FY06). The IT-ITES industry continues to grow five times as fast as the global IT services industry, clocking a compound annual growth rate (CAGR) of 28 per cent since FY 1999-2000. Of this, software and services exports are estimated to grow by 32 per cent (CARG), to reach $23.4 billion in FY06.

The industry grew steadily in FY05. Along with the increased presence of Indian IT companies across the globe, new service lines emerged and the industry reached the next level in services offered. Mergers and acquisitions by Indian players was also a key feature. In spite of the growth seen so far, it is estimated that less than 10 per cent of the addressable market for globally sourced IT-ITES has been captured, indicating significant headroom for growth. NASSCOM has forecast that a growth rate of over 25 per cent is expected to continue and would help Indian IT-ITES exports exceed $60 billion by FY 2010.

1.4.2 Service Exports from India 2004-05

Exports accounted for 64 per cent of aggregate earnings of IT-ITES in 2004-05. India's IT-ITES exports totalled $17.7 billion in 2004-05. Of this, 68 per cent were to the US, 23 per cent to Europe (of which 14 per cent headed for UK) and 9 per cent to the rest of the world. NASSCOM estimates that in 2005-06 Indian IT exports (including hardware and software in addition to services) would exceed $23.9 billion compared to $18.2 billion in 2004-05.

Figure 1: The Indian IT-ITES Service exports



Source: NASSCOM Strategic Review 2006

Europe and the US remain the key markets, accounting for over 90 per cent of IT-ITES exports. However, export earnings from markets other than the US and the UK

[1] C. Qiang, G. Clarke and N. Halewood, "The Role of ICT in Doing Business," in ICT Trends Report, (Washington DC: World Bank, 2005).

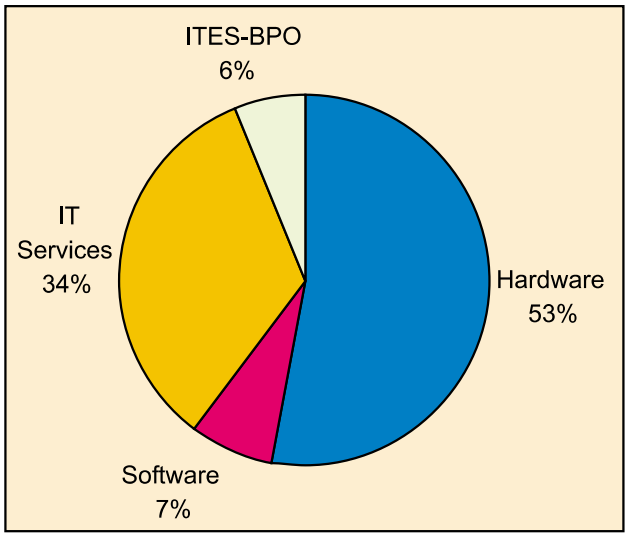
are also witnessing significant double-digit, year-on-year growth. While Indian service providers have built delivery centres in key source markets like the US, they are expanding their footprint in specialist locations like China for engineering and design, South Africa for insurance and near-shore locations like eastern Europe and Mexico. Apart from companies in the US, organisations from Europe, South-East Asia, Australia, Japan, Hong Kong, New Zealand, etc. are also reaching out for Indian software expertise.

1.4.3 Domestic IT-ITES Market

India continues to be one of the fastest growing IT and telecom markets. It grew by 24 per cent in 2003, providing tremendous opportunities for IT and telecom vendors and service providers. In 2003, India was ranked 21st among IT spenders and could move up to the 14th position in 2008.

The domestic IT-ITES market was valued at US$10.2 billion in 2004-05 and is expected to exceed $12.4 billion, growing at nearly 22 per cent in the current (2005-06) fiscal. The IT services segment in the domestic market is expected to touch $4.5 billion in 2005-06, exhibiting an 11.5 per cent CAGR over 2001-2005. The domestic IT-ITES or BPO segment is showing a CAGR of 60 per cent over 2002-2006 and is expected to be $0.9 billion in 2005-06.

Figure 2: Domestic IT-ITES Market 2004-05



Source: NASSCOM Strategic Review 2006

The IT Software and Services export segment is a key driver of the overall IT market. The Indian IT sector, enlarging from $1.73 billion (Rs 5,450 crore) in 1994-95 to a $13.5 billion (Rs. 64,200 crore) industry in 2001-02, has depended heavily on software and services exports for its healthy year-on-year growth and for a larger share of the Indian GDP pie. In terms of share of GDP, the IT industry's slice has risen from 0.59 per cent in 1994-95 to 2.87 per cent in 2001-021. The NASSCOM Strategic Review puts the software (IT-ITES) sector's contribution to GDP at 4.8 per cent in financial year 2005-06.

The software industry has been slowly moving up the value chain from Programming to Systems Analysis and Design. More offshore work is now being executed in India. R&D centres and manufacturing (albeit only assembling of components) facilities are being set up in India by MNCs. New policies and plans with fiscal incentives, modifications in export-import policies and support for infrastructure are now driving foreign investment and focussing on providing impetus to software and hardware sectors of the IT industry – both domestic and export. This is also creating changes in the grey market.

However, infrastructure and finance appear to be the main deterrents to growth. The hardware sector, on the other hand, was relegated to the background and has not made much progress. While "manufacturing" in the Indian IT industry means merely assembling, some component manufacture does take place for non-IT applications.

1.4.4 Size and Scope of Global Opportunity

Forecasting India's sustained leadership position in the global outsourcing industry, the NASSCOM –McKinsey Report 2005 estimated that India had till that point in time addressed only 10 per cent of a potential market whose size exceeds $300 billion. The report estimated that almost 35 per cent of this opportunity (or $10 billion) is expected to be relocated from source countries to low-cost offshore locations like India. It expects that the Indian IT and BPO industries could grow at an annual rate greater than 25 per cent and generate exports of about $60 billion by 2010. The report predicts that innovation by industry players in India could accelerate growth and add an additional $15-20 billion in export revenue over the next 5-10 years.

[2] http://www.witsa.org/profiles/IndianSoftwareScenario.pdf.

In outsourcing, services like Hardware and Software Maintenance, Network Administration and Help Desk Services are expected to account for more than 45 per cent of the $150-180 billion addressable market for off-shoring, and are likely to be drivers of growth. Today's service lines, such as Application Development and Maintenance and R&D Services, have already reached penetrations of 30-35 per cent and are not likely to show dramatic growth.

In the addressable market of $120-150 billion for global off-shore BPO services the Report predicts that the growth is expected to be driven by traditional industries (Retail, Banking, etc.) and cross-industry functions such as Human Resources, Finance and Accounting.

India continues to be the offshoring destination of choice. The NASSCOM Strategic Review 2006, based on an A.T. Kearney Global Services Location Index for 2005, lists India at the top of the table of 40 nations.

1.4.5 Employment trends

Indian software and services industry's strong value proposition – existence of a large, English speaking and technically qualified manpower, competitive billing, high productivity gains and scalability – which had helped the country emerge as a key IT services outsourcing destination, continue to hold her in good stead. These intrinsic strengths and advantages gave India a leg up in the burgeoning ITES-BPO space as well, taking it beyond the realm of IT services.

The total number of IT and ITES professionals employed in India has grown from 284,000 in 1999-2000 to over 1 million in 2004-05, expanding by over 200,000 in the last year alone. NASSCOM expects this number to reach 1,287,000 in 2005-06.

1.4.6 Break-up of Professionals in the IT industry

Most of the new recruits in the industry are fresh graduates, indicating the availability of a large pool of resource each year as opposed to the poaching witnessed in other industries. A break-up of the 1 million professionals in different sectors indicates that the number of employees in the ITES-BPO segment has witnessed the highest levels of growth over the past few years – which may be attributed to the tremendous growth in demand. ITES companies recruited approximately 100,000 professionals in 2004-05. Companies in the IT software exports sector recruited 75,000 professionals in 2004-05, compared to 65,000 in 2003-04.

In addition to a 1.3 million strong workforce employed directly in the industry, Indian IT-ITES is estimated to have helped create an additional 3 million jobs through indirect and induced employment. Indirect employment includes expenditure on vendors, including telecom, power, construction, facility management, IT, transportation, catering and other services. Induced employment is driven by consumption expenditure of employees on food, clothing, the utilities, leisure, health and other services.

Table 1: Break up of Professionals Employed in Indian IT and ITES Sectors

	2001-02	2002-03	2003-04	2004-05
Software Exports Sector	170,000 (32.6%)	205,000 (30.6%)	270,000 (32.1%)	345,000 (33.0%)
Software-Domestic Sector	22,000 (4.2%)	25,000 (3.7%)	28,000 (3.3%)	30,000 (2.9%)
Software- in House Captive Staff	224,250 (42.9%)	260,000 (38.8%)	290,000 (34.5%)	322,000 (30.8%)
ITES-BPO	106,000 (20.3%)	180,000 (26.9%)	253,500 (30.1%)	348,000 (33.3%)
Total	**522,250**	**670,000**	**841,500**	**1,045,000**

Source: NASSCOM

1.5 Policy Measures: Evolution and Current Status

Contrary to general perception, the importance of promoting software development, particularly for export, had been recognised by the erstwhile Department of Electronics (DoE). Suitable policies and programmes were put in place as far back as 1972 (Parthasarathi and Joseph, 2002). During a period when very high tariff and non-tariff barriers were the rule, firms were permitted to import computer systems duty-free and no clearances were required for firms involved in software exports. Moreover, restrictions on Foreign Direct Investment (FDI) notwithstanding, totally foreign-owned companies were permitted to set up software export operations, provided they located themselves in the Santacruz Electronics Export Processing Zone (Government of India 1972). Later, in January 1982, a Software Export Promotion Policy was initiated by the Department of Electronics (Government of India).

The Computer Policy of 1984 gave further thrust to software development by underlining the need for institutional and policy support on a number of fronts. The policy, for example, called for the setting-up of the Software Development Promotion Agency (SDPA) under the Department of Electronics. The import of inputs needed for software development was further liberalised.

After 1984, world ICT trade was expected to reach $100 billion by 1990, more than half of which was estimated to be in software. India's software export projections were based on a target of $300 million, which corresponded to about 0.6 per cent of the world's software trade. Based on this, it was felt that there was a need for more concrete policies for the promotion of software development and export. Thus, in 1986, an explicit policy was announced identifying software as one of the key sectors in India's agenda for export promotion, and, underlining the importance of an integrated development of software for the domestic and export markets (Government of India 1986). The policy had the following objectives:

- Promote rapid growth of software exports to a take a quantum jump and capture a sizeable share of the international software market.
- Promote the integrated development of software in the country for domestic as well as export markets.
- Simplify the existing procedures to enable the software industry to grow at a faster pace.
- Establish a strong base for the software industry in the country.
- Promote the use of the computer as a decision making tool; to increase work efficiency and to promote appropriate applications which are of development catalysing nature with due regard to the long-term benefits of computerisation to the country as a whole.

To achieve the objectives, the Policy, emphasising the need to simplify existing procedures, provided various commercial incentives to software firms. These included tax holidays, income tax exemption on software exports, export subsidies and duty-free import of hardware and software for 100 per cent export purposes.

With the initiation of economic reforms in the early 1990s, the Finance Ministry made an assessment of new industrialisation. This highlighted the fact that, apart from the general orientation of industries towards export markets, India's comparative advantage was in software and not hardware. Therefore, a major thrust was consciously given to software exports. Accordingly, new policy measures were initiated *inter alia* for the removal of entry barriers for foreign companies, lifting of restrictions on foreign technology transfers, participation of the private sector in policy making, provisions to finance software development through equity and venture capital, reforms for faster and cheaper data communication facilities, and the reduction/ rationalisation of taxes, duties and tariffs, etc. (Narayanamurthy 2000).

The first National Workshop on ICT focussed on IT policies and their implementation, was organised at the Administrative Staff College of India (ASCI), Hyderabad in October 2001. In the context of improving ICT performance in India, it was strongly felt that the following were needed:

- Enhancing citizen awareness on the potential of ICT services/application.
- Upgrading IT skills of Government employees.
- All States/Union Territories must adopt common standards.
- Common evaluation methodology must be evolved for hardware and software selection to drive maximum benefit from investment.

- Continuous experience sharing between State and Union Territory Governments on projects.
- Sufficient resources to be allocated to build reliable ICT infrastructure.

The Approach Paper to the Tenth Plan (Government of India, 2001) had been prepared against a backdrop of high expectations arising from the recent performance of GDP growth. The GDP growth rate improved from an average of about 5.7 per cent during the 1980s to about 6.5 per cent between 1997 and 2002, making India the second fastest growing major economy. A substantial part of this buoyancy was due to the growth in the Services sector led by ICT and telecom. The Tenth Plan stressed the need for defining the development objectives not just in terms of increases in GDP or per capita income, but broader parameters which enhance human well being. It attempted to focus on inter-State inequities and underlined the strategies to overcome the regional disparities in deferring economic growth rates. The Tenth Plan emphasised those sectors which were most likely to create high employment opportunities, such as construction, real estate housing, modern retailing and IT-enabled services, etc. Moreover, it recognises the comparative advantage of brainpower to absorb, assimilate and adopt spectacular developments in system integration and technology and harness them for national growth in the knowledge-based global economy. Technology and knowledge could be a tool to give India a competitive advantage in the new global economy, provided policies to harness human resource strengths and capabilities are in place.

The plan identified telecommunications as a critical part of infrastructure in the emerging, knowledge-based economy. It attributed the importance of telecommunications to the dramatic growth of IT and its potential impact on the rest of the economy because India was perceived to have a comparative advantage. To maintain this, the Telecommunication Policy moved its focus to the convergence of data, voice and image transmission, the use of bandwidth and high-speed Internet connectivity.

The Government tried to improve the IT infrastructure in India by tackling the shortage of proper power supply and the huge gap between demand and supply of bandwidth. With respect to infrastructure development, of the 23 proposed recommendations of the first workshop on ICT, 19 were characterised as “ongoing”. On the proposal for making available updated information at the panchayat level, the National Informatics Centre (NIC) was involved in the creation of online databases (NICNET) for access by the public. In an inaugural session of the ASSOCHAM (Associated Chambers of Commerce and Industry of India) Summit on “India in a knowledge Millennium” held in 1999, the then Prime Minister declared that “knowledge-based society will enable us to leapfrog in finding new and innovative ways to meet the challenges of building just and equitable social order and seek urgent solution.” (Venkatsubramaniam, n.a.)

The Task Force, which was constituted at the very beginning of this Millennium, suggested the maximum number of recommendations in the developmental sector – 45. Even though the Task Force suggested the creation of citizen charters and the development of a smart card programme, the Action Taken Report (ATR) ruefully noted that only 59 wings of the State apparatus had notified the charter and that no mention was made regarding their effectiveness and implementation. For creation of e-Governance, the Government had to first train the manpower for operations and assess the need of technical personnel to maintain the system. Moreover, the Government was launching awareness programmes to explain to people the advantages of IT, as people participation was deemed a necessary input for the success of the programmes. Also, the Government had to ensure proper physical and mechanical infrastructure for their transformation (Jayanth, 2000). Subsequently, the Government adopted a strategy to explain the concept of IT to society, why it was needed, and how it could transform lives. This was done by spreading information networks in villages as well as through establishment of computer service centres or computer information centres.

Along with policy reforms by the Central Government, various States enacted their own IT policies to promote ICT. These generally focussed on the key issues of infrastructure, e-Governance, IT education and means to create environments to engender IT proliferation.

In addition, the Government introduced certain institutional interventions. Several national task forces studied all aspects of IT over the past few years and most of their recommendations were acted upon. More significantly, chief executives of leading private IT

companies were roped into these task forces. A number of Government agencies involved in different aspects of IT were brought together into an integrated Ministry of Information Technology. It was followed by an IT Act to deal with a wide variety of issues relating to the IT industry (Parthasarathi 2001).

One notable improvement was the establishment of Software Technology Parks of India (STPI) under the Ministry of Communication and Information Technlogy to provide the necessary infrastructure for software export. STPI acts as a single window service for software exporters and incubation infrastructure to small and medium enterprises (SMEs). Among the first were the parks at Bangalore, Pune and Bhubaneshwar, which were set up in August, October and December 1990, respectively. In 1991, four more STPs were started by the DoE at Noida, Gandhinagar, Thiruvananthapuram and Hyderabad. Today, there are 18 such parks in different parts of the country and they play a significant role in software exports. The total number of units registered with the STPs increased from 164 in 1991 to 5,582 in 1999, accounting for about 68 per cent of India's IT exports. In 2006, STPI commissioned new centres at Jammu (Jammu and Kashmir), Jodhpur (Rajasthan) and Siliguri (West Bengal). With the addition of these three new centres, STPI now has 47 centres across the country. By December 31, 2005, a total of 6,129 units were operational and 4,088 were exporting. STPI member units exported software worth over Rs 74,019 crore during 2004-05. Software exports are estimated to be around Rs 95,000 crore during 2005-06.

E-Readiness Index of the States in India 2005

CHAPTER TWO

E-Readiness Index of the States in India 2005

2.1 Introduction

The value of the e-Readiness Index at the State level reflects the capacity of a State to participate in the networked economy in relation to the country at large. In continuation of the last two years' work and in the light of newly available data, the States have been ranked using the same methodology and framework of analysis as had been used earlier. Drawing upon past experience and discussions with the DIT, the questionnaire was designed more comprehensively to include a greater number of relevant questions along with appropriate consistency checks. This allowed us to include more than 50 more variables than last year. These are relevant variables that were not considered last year due to non-availability of the required information. We have also refined our analysis through suitable transformation of some of the policy variables. There have been some notable shifts in the ranking this year, which we would consider in a later chapter.

2.2 Framework of Analysis 2005

The Framework used in the study is based upon the following premises:

- There are three important stakeholders to consider in the development and use of ICT: individuals, business and Governments.
- The degree of usage of ICT by (and hence the impact of ICT on) the three stakeholders is linked to their degrees of readiness (or capability) to use and benefit from ICT.
- There is a general macroeconomic and regulatory environment for ICT in which the stakeholders play out their respective roles.

The logical underpinning being the environment for ICT offered by the concerned State Governments, the readiness of the key stakeholders (individuals, businesses and Government) to use ICT and finally the usage of ICT by these various stakeholders.

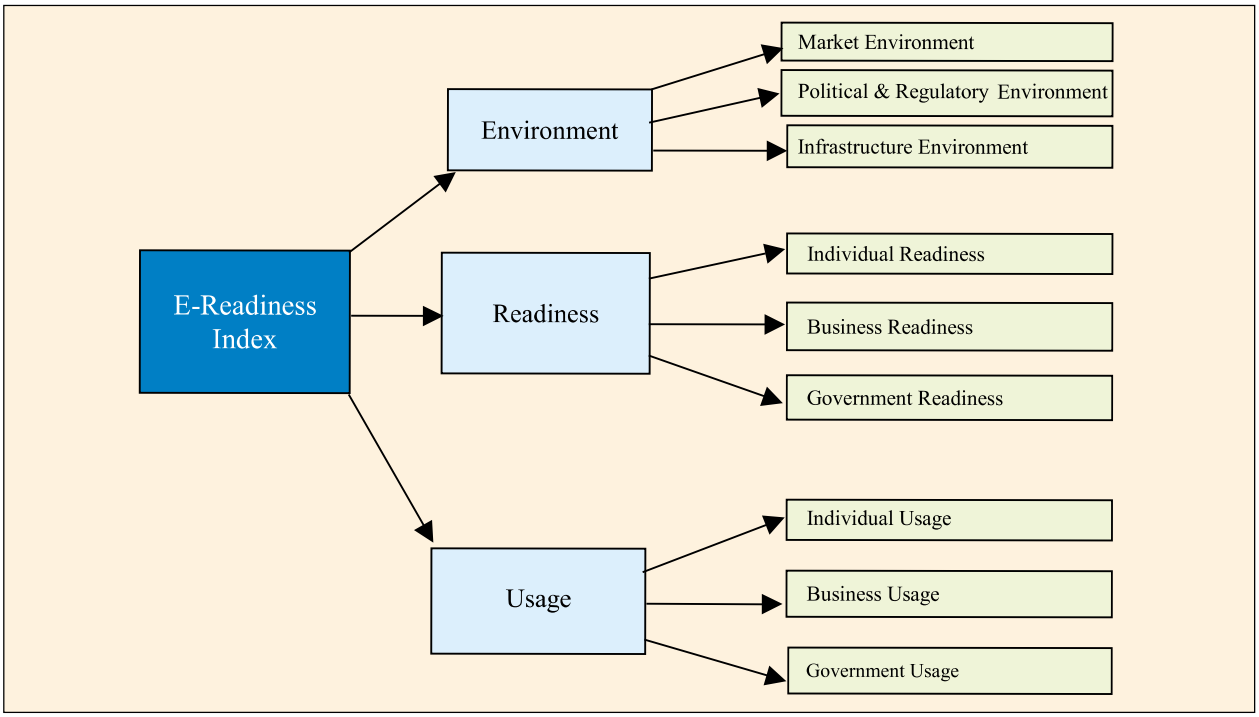
Identification of the levels of e-Readiness at the State level requires a three-step procedure.

1. Identification of appropriate measures of those characteristics.
2. Identification of the most important characteristics that represent e-Readiness.
3. A rating of States based on the Composite Index, which reflects the position of a particular State, as indicated by the comparative position of important characteristics identified in Step 2.

The e-Readiness Index developed by us is composed of variables that fall into three broad categories: 'Environment', 'Readiness' and 'Usage' as shown in Figure 3.

The sub-categories have been further divided into various user categories. The complete list of indicators and sub-indicators are presented in Annex II. Appropriate variables have then been selected which best reflect the chosen categories. Since many factors affect the level of advancement of a State in terms of ICT, it is essential to form a Composite Index that incorporates a large number of relevant variables into it. There are different ways to form a Composite Index where all the selected indicators are represented by one single indicator that facilitates easier comparison of the States. The key issue in this integration process, however, is the identification of the weights that have to be assigned to each variable. As

Figure 3: The Networked Readiness Index Framework



stated earlier, Principal Component Analysis (PCA) has been chosen as the appropriate approach for constructing a single Composite Index out of a large number of variables with the help of a quantitative database. The details of the PCA approach are given in Annex I. The weighting scheme of the variables through PCA allows the model to determine weights based on the data itself, and, thus reduces the possibility of the imposition of any external subjectivity on the Composite Index. The characteristics of the PCA approach and various other methods of forming the Composite Index, along with the advantages and disadvantages of each approach, are discussed in the methodology section of this chapter.

2.3 Data Sources

As mentioned earlier, our model considers three broad categories to construct the e-Readiness Index at the State level. The variables representing these categories are both quantitative and qualitative. The qualitative data was transformed into a quantitative form for the purpose of the model.

Data from both secondary sources and primary collection was collated for the analysis. Secondary sources included were DoT Annual Statistics, Statistical Abstracts, Economic Survey, Census publication and various web sites. Primary data collection was through a survey of the various departments of the State Governments using a well structured questionnaire. The raw data was then transformed into variables representing indicators and sub-indicators wherever required using appropriate normalisation factors. This transformation of the raw data into relevant variables is essential to maintain the comparability of the indicators across the States.

Some of the indicators considered initially for the model were dropped due to non-availability and/or inaccuracy of data. Indicators where information for more than 50 per cent of the States was not available were dropped. Apart from that the data has been adjusted through appropriate interpolation and extrapolation norms in case of most of the variables for the States where the data was not available. Extrapolation norms are identified either through correlation with relevant explanatory variables or based on an income criterion which is considered as the most effective means for this purpose. In some cases, where extrapolation is not possible, the missing data has been replaced by an appropriate statistic.

2.4 Methodology

We measure e-Readiness of the States through an empirical model using PCA. This is a multivariate

analytical tool. This approach develops a Composite Index by defining a real valued function over the relevant variables objectively. There are various methods of index construction. In case of studies relating to health, indices may be created from anthropometric measurements. Researchers assign scores depending on subjective judgements about the attributes that are being studied. Multi-criteria analysis (MCA) methods like Analytic Hierarchical Process (AHP) can also be used where the weightage given to the indicators is determined through preferences of the stakeholders. However, this method requires an additional survey involving all the stakeholders which is time consuming and costly. Regression techniques are used when the purpose is to predict the value of the dependent variable through selection of a best subset of the explanatory variables. By construction, this method maximises the correlation among the variables and, therefore, explains the maximum variation in the dependent variable.

In our case we have an unobservable dependent variable case. The States' e-Readiness is an unobserved variable, which cannot be concretely measured through a single available indicator. There are several indicators which indicate e-Readiness collectively. The problem is to find an appropriate way to combine these indicators to form a Composite Index reflecting it. The weights should be assigned objectively to these indicators to reflect their importance in enhancing the e-Readiness of a State. Thus we don't have a Dependent/Independent Variable Framework. Hence, Regression Analysis is not appropriate in our case. PCA is a widely used technique in such circumstances, which yields composite indices by assigning weights objectively to the indicators.

PCA helps in determining the most important variable or a limited number of variables from a given set of explanatory variables. This method is based on the fact that when different characteristics are observed about a set of events, the characteristic with relatively greater variation explains a greater amount of the variation in the dependent variable, compared to a variable with lesser variation in it. Therefore, the issue is one of finding weights to be given to each of the concerned variables. Weights are based on the principle that the variation in the linear composite of these variables should be the maximum.

The main purpose of this modeling exercise is to quantify the levels of achievement of each State in terms of an e-Readiness Index (composite) based on certain relevant characteristics. The logic of the exercise flows from the simple assumption that higher levels of these characteristics reflect a greater state of e-Readiness.

To compare the States in terms of e-Readiness, we have to reduce the relevant factors or variables into one single measure or a Composite Index. A Composite Index can be defined as a linear combination of variables assigning equal or different weights to the variables. These weights can be determined subjectively or based on some statistical or econometric technique. In many cases, equal weights are used to form the Composite Index where it is assumed that each and every variable is equally important in explaining the phenomenon. Sometimes, subjective weights are used when the importance of the variables is known a priori and imposed externally.

We have used a multi-stage PCA to construct the e-Readiness Index of the States. Annex 1 contains the details of this model. In case of multi-stage PCA, the Composite Index formed at a lower level is used as a variable in the next step for computing the Composite Index and so on. Therefore, in this approach, important variables are identified at various stages. We have used the first principal component to form the Composite Index that is characterised by the property of having the largest sum of squared correlations. This process is applied to each sub-group of the identified components of e-Readiness. The first principal factors obtained from the different sub-groups were treated as a set of new variables and combined at the second stage to obtain the index of the components. Similarly, the first principal component of the broad indicators of e-Readiness was used to obtain the Composite e-Readiness Index (Figure 3). The following steps were used in constructing the e-Readiness Index:

1. First, we used PCA to combine the indicators and construct indices for each sub-group (Market Environment, Political and Regulatory Environment, Infrastructure Environment, Individual Readiness, Business Readiness, Government Readiness, Individual Usage, Business Usage and Government Usage)
2. In the second step, we combined these sub-group indices (using PCA) under each group index to arrive at next level of aggregation (Environment Index, Readiness Index and Usage Index).
3. Finally, we constructed the aggregate e-Readiness Index by combining the Environment, Readiness and Usage indices (again through PCA).

This method alleviates the necessity of taking more than one principal factor, since the co-relations among the variables in a sub-group are generally high. Consequently, the first principal component explains an adequate proportion of variation in the data matrix. This method has been extensively used by regional scientists because of its optimality property.

2.5 Results

We have confirmed the validity of including only the first principal component in our model through statistical tests. The model derived three principal components, as there are three categories included in it. The strength of each factor in representing the model is computed by the corresponding EigenValues. The EigenValue is also suggestive of the explanatory power of a particular component. Any principal component with an EigenValue of 1.0 and above may be considered an important factor in explaining the model. The first component of our model has an EigenValue of 2.48 and all the other principal components have EigenValues of less than 1.0. The percentage of variance explained by the first principal component is more than 82 per cent. These facts, along with the Scree Plot[3] are indicative of the fact that the first principal component is sufficient to compute the Composite Index of e-Readiness. A similar procedure was also followed for the sub-indices.

2.6 The Composite e-Readiness Index

The PCA Analysis generated the weights to be assigned to the indicators of e-Readiness optimally. The procedure has already been outlined in the methodology section of this chapter. The following table gives the weights and relative weights assigned to each indicator. As is evident from the table, the model has assigned almost equal weightage to all three indicators indicating that they are almost equally important (with Environment having a slightly higher relative weight) in the overall Index of e-Readiness.

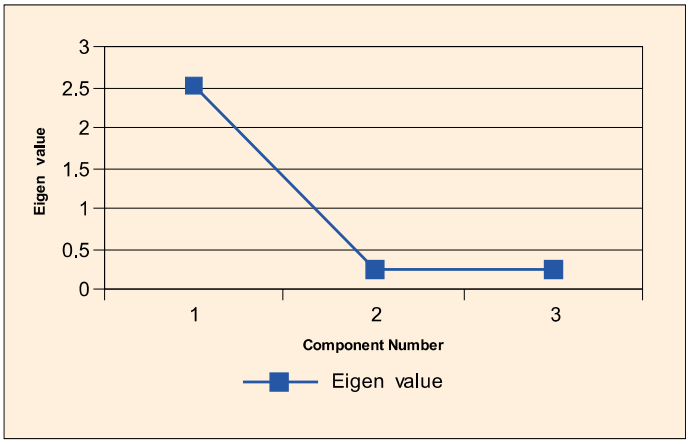
Table 2: The Weights of the Indicators for the Final Composite Index

Indicator	Weight	Relative weight (per cent)
Environment	0.602	34.7
Readiness	0.556	32.1
Usage	0.574	33.2

Based on these weights, we have combined the variables linearly to arrive at the Composite Index. The composite scores have been classified into six groups on the basis of the Standard Deviation across the Sates. One should remember while interpreting the scores that these are relative in nature and should be interpreted as 'higher the value, higher the e-Readiness level of the State'. Due to the nature of the Composite Index, it is better to study them in groups rather than compare them in terms of the magnitude of the Composite Index. The categorisation of the States based on their level of e-Readiness is presented in Figure 5.

Table 3 presents a distinctive picture of the region-wise distribution of the States according to their status of e-Readiness.

Figure 4: Scree Plot



[3] A scree plot shows the contribution of the components in the model.

Figure 5: E-Readiness - Indian States

Table 3: Regional Distribution of the States/UTs in terms of e-Readiness Index

Region	Leaders	Aspiring leaders	Expectants	Average achievers	Below Average Achievers	Least Achievers	Total
Central	0	0	1	1	0	0	2
East	0	0	1	1	1	2	5
North	1	3	0	2	2	0	8
North-east	0	0	0	1	3	4	8
South	3	1	1	0	0	1	6
West	1	2	0	1	0	2	6

Note:
North - Punjab, Uttar Pradesh, Uttaranchal, Jammu & Kashmir, Himachal Pradesh, Haryana, Delhi and Chandigarh
South - Tamil Nadu, Pondicherry, Lakshadweep, Kerala, Karnataka and Andhra Pradesh
Central - Chattisgarh and Madhya Pradesh
East - Andaman & Nicobar Islands, Bihar, Jharkhand, Orissa and West Bengal
West - Dadra & Nagar Haveli, Daman & Diu, Goa, Gujarat, Maharashtra and Rajasthan
North-East - Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura

2.7 Sub-Index: Environment

The Environment sub-index is designed to measure the degree of conduciveness of the environment that a country provides for the development and use of ICT. This sub-index has been computed on the basis of three indicators: Market Environment, Political and Regulatory Environment and Infrastructure Environment. These indicators can be further sub-divided as shown in Table 4.

Table 4: Indicators for Environment

Indicators	Sub-Indicators
Market Environment	• ICT exports / total exports • Competition in the ISP sector: - Number of Players - Market share of lead players (in per cent) • Competition in the cellular sector: - Number of Players - Market share of lead players (in per cent) • Competition in the Telecom sector: - Number of Players - Market share of lead players (in per cent) • Range of price charged for internet connection (per 100 hours)
Political and Regulatory Environment	• Does IT policy exist? - When was the ICT Policy initiated? - How often is the ICT Policy revised? • Does it contain the following sections: - Enabling Policy - Regulatory Policy - Legal Policy - Security Policy • Is there a Performance Matrix of the state for monitoring policies? • Is the issue of IPR addressed in the ICT policy? • Is there effective legal machinery to tackle the problem of piracy of ICT products? • Does a state level action plan exist? • State e-Governance mission team (SeMT) been set up for e-Governance projects? • Is there a transparent policy for public private partnerships (PPP) for e-Governance activities? • Has the Government given support to ICT in way of initiatives, priorities, policies and interests? • Time taken to get clearance for starting an ICT business • Does a supplementary budget exist for state level projects? • Has an e-Governance committee been set up? • Is there a Mission/Objectives/Strategies and Tactics (MOST) documents for e-Governance? • Has the State enacted the IT ACT 2000 which is applicable to all States? • Are there cyber laws that confer legal status to electronic transactions and documents? • Is there a law on regulation of digital signatures and encryption? • Have any concessions been given to industries/companies for ICT activities? • Are subsidised utilities provided to ICT firms? • Any sales tax concessions have been given to ICT companies? • Give the total number of complaints/cases registered relating to IPR • Number of initiatives taken for telecom regulation and ICT trade policy? • Are there any public private partnerships for development of ICT infrastructure?

Table 4: Indicators for Environment

Indicators	Sub-Indicators
Infrastructure Environment	• Number of villages with Village Public Telephones (VPTs) / total villages. • Number of public pay telephones / '000 population. • Waiting time for telephone lines (Number of days). • Total number of telephone mainlines / total population. • Total number of cellular connections / '00 fixed lines. • Number of schools with Internet access / total schools • Number of schools with Computer labs access / total schools. • Number of schools with websites / total schools. • Number of colleges with Internet access / total colleges. • Number of colleges with Computer labs access / total colleges. • Number of colleges with websites / total colleges. • Number of universities offering ICT courses / total number of universities. • Number of universities / Institutes with online courses / total number of universities. • Is there a dedicated infrastructure for ICT? - Wireless networks - Optical Fibre Cable (OFC)/Networks - IT parks - State Wide Area Network (SWAN) - State Data Centers (SDCs) • Number of kiosks in rural areas per village • Average distance in kilometres from the nearest - Primary School - Post Office - Public Telephone booth - Computer Training Center - College - Internet Kiosk - Medical Store • Number of public access to the internet (cyber cafes registered)

The variables that emerged as significant while computing the Environment Sub-Index are presented in Table 5. These variables have been accorded significant weight by the model in comparison to the other variables. Thus, States having higher value in these variables are likely to get a higher rank in terms of the Environment Sub-Index.

Table 5: Environment: Indicators of Significance

Market	Political and Regulatory	Infrastructure
• Number of players in the Telecom sector. • Number of players in the ISP sector • Competition in the Telecom sector • Number of players in the Cellular sector	• Proportion of Policies taken for e-governance • Proportion of Policies taken for ICT companies • Proportion of Security Policies	• Average distance in kilometres from the nearest: - Primary School - Post Office - Public Telephone booth - Computer Training Center - College - Internet Kiosk - Medical Store

As can be seen from the Table 5, competitive market environment, education and access to communication facilities significantly affect the environmental readiness of the States. Competition among players in the ICT sector gives the consumers better quality products at affordable prices. Education makes people capable of harnessing the advances in technology and access to communication facilities aid in enhancing the e-Readiness of the States.

The categorisation of the States based on the Environment Sub-Index is shown in Table 6. Levels L1 through L6 show the States that fall in the category of 'Leaders' to 'Least Achievers'. The categorisation has been based on the mean and standard deviation of the values of the sub-indices.

Table 6: Categorisation of the States/UTs Based on Sub-Index-Environment

Levels	States	Number of States
Level 1	Chandigarh, Maharashtra, Tamil Nadu, Punjab, Goa	5
Level 2	Haryana, Delhi, Kerala, Andhra Pradesh, Karnataka, Gujarat, Pondicherry, Uttar Pradesh	8
Level 3	Sikkim, Chattisgarh, Himachal Pradesh, West Bengal, Rajasthan, Uttaranchal	6
Level 4	Meghalaya, Orissa, Jharkhand, Mizoram, Madhya Pradesh, Assam	6
Level 5	Bihar, Nagaland, Jammu and Kashmir, Lakshadweep	4
Level 6	Manipur, Tripura, Arunachal Pradesh, Andaman & Nicobar, Dadra & Nagar Haveli, Daman & Diu	6

The region-wise distribution of the States according to their status of Environment Sub-Index is given in Table 7.

Table 7: Regional distribution of States/ UT's based on Environment Sub-Index

Region	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Total
Central	0	1	1	1	0	0	3
East	0	0	1	2	1	1	5
North	2	2	3	0	1	0	8
North-East	0	0	1	3	1	3	8
South	1	4	0	0	1	0	6
West	2	1	0	0	0	2	5

The numbers of States in Level 6 have significantly reduced in comparison to last year. This implies that States have taken initiatives to provide a sound environment for ICT development.

2.8 Sub-Index: Readiness

The readiness of a State in this context measures the capability of the principal agents of an economy (Individual, Business and Government) to leverage the potential of ICT. The Readiness Sub-Index is composed of sub-indicators representing Individual Readiness, Business Readiness and Government Readiness. These are listed in Table 8.

Table 8: Indicators of Readiness

Indicators	Sub-Indicators
Individual Readiness	• Per cent of total household with the following consumer goods - Television (TV) - Personal Computer (PC) - Telephone - Cellular Phone - Internet Connection - Cable Connection • Number of IT qualified teachers / total teachers. • Total number of Engineering students / total Technical students. • Total MCA Students/ total Technical students • Total BSc (Computer Science) students/ total Technical students • Total Diploma in Computer Application students/ total Technical students • Total 12th pass (computer science subjects) students/ total Technical students • Literacy rate
Business Readiness	• Total number of IT parks. • Companies registered in IT parks per IT park • Total number of employment in IT companies / total number of IT parks. • Number of registered training centres / '000 population. • ICT exports to total exports. • Number of ICT jobs to total jobs
Government Readiness	• Percentage of Government expenditure on - Primary Education - Secondary Education - Under Graduate Education • Does an intranet exist in government departments? • Total number of government websites. • Total number of websites in local language. • Do ERP/online Performance Evaluation System packages exist? • Does a PERT chart exist for new ventures? • Percentage of CICs set up by the Government • Percentage of CICs set up by Private sector • Number of CICs per village • How many ministries use ICT in governance process/functioning process? • Percentage of internet connections - Dial up - Wide band-not dial-up upto 256 kbps - Broadband (registrations received by BSNL and MTNL, 2005) • Does a separate ministry exist for ICT? • Percentage of top officials trained in ICT/with access to computer training programme. • Number of government officials with online training programme.

The variables of significance in this category are presented in Table 9. Variables of significance for Individual Readiness primarily depend on the level of education of individuals. Here again, Education emerges as an important variable. Thus, the State Governments should lay special emphasis on enhancing expenditure on Education. Government Readiness depends significantly on availability of on-line training programmes for officials and provision for usage of ICT as a governance tool.

Table 9: Readiness: Indicators of Significance

Individual	Business	Government
• Total BSc (Computer Science) students/total Technical students • Total number of Engineering students/total Technical students. • Total MCA Students/total Technical students • Percent of total household own consumer goods - Computer - Telephone - Mobile Phone	• Total number of employment in IT companies/total number of IT parks. • ICT exports to total Exports.	• Proportion of policies taken for ICT Readiness • Percentage of Top Officials with on-line training Programmes • Percentage of Government expenditure on Secondary Education • How many Ministries use ICT in governance process/functioning process?

The categorisation of the States based on "Readiness Sub-Index" is presented in Table 10.

Table 10: Categorisation of States / UT's based on Readiness Score

Levels	States	Number of States
Level 1	Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Punjab, Maharashtra	6
Level 2	Uttar Pradesh, Haryana, Lakshadweep, Madhya Pradesh, Chandigarh	5
Level 3	Orissa, Rajasthan, Uttaranchal, Delhi, West Bengal, Jharkhand	6
Level 4	Himachal Pradesh, Goa, Gujarat, Chattisgarh, Jammu & Kashmir, Assam, Pondicherry	7
Level 5	Sikkim, Meghalaya, Manipur, Mizoram, Bihar	5
Level 6	Nagaland, Tripura, Arunachal Pradesh, Andaman & Nicobar, Dadra & Nagar Haveli, Daman & Diu	6

Table 11 presents the region-wise distribution of States according to the status of the Readiness Sub-Index.

Table 11: Regional Distribution of States/ UT's based on Readiness Sub-Index

Region	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Total
Central	0	1	0	1	0	0	2
East	0	0	3	0	1	1	5
North	1	3	3	3	0	0	8
North- East	0	0	0	0	3	3	8
South	4	1	0	1	0	0	6
West	1	0	0	2	0	2	5

2.9 Sub-Index: Usage

Usage aims at measuring the degree of utilisation of ICT by Individuals, Business and the Government. The sub-indicators of this category are presented in Table 12.

Table 12: Indicators of Usage

Indicators	Sub-Indicators
Individual Usage	• Average household monthly expenditure on - Internet Access - Cell phone - Cable Connection - Telephone • Current year to year growth rate in the number of internet users in past 2 years • Per Capita Net State Domestic Product
Business Usage	• Share of companies using - Lease Lines - ISDN - VSAT
Government Usage	• WLL phones in rural areas / total number of villages. • Application of ICT in Agriculture. • Application of ICT in Health services. • Application of ICT in Transportation. • Application of ICT in Energy. • Application of ICT in Trade. • Total number of e-Governance projects undertaken. • Have Government employee records been computerised? • Facilities available online: - Land records - Movable Property - Stamp paper registration - Utilities billing - Crime registration - Municipality administration - Birth & Death Certificates - Documentation of Policy • Government expenditure on IT/NSDP • Status of accessibility of the information and services by the citizen • e-Governance training programmes and workshops per e-Governance project • Number of participants per e-Governance workshop

The various indicators of significance presented in Table 13 show the variables that received a higher weightage in the computation of the Composite Index. Income is a significant variable in the Usage Sub-Index. A State may have state-of-the-art facilities, a number of institutions imparting ICT education, but it is ultimately the incomes of potential users that determines the usage of ICT across States. As far as the Government is concerned, in all three categories, the greater the engagements of the State Government in this sector, the better the e-Readiness of the State.

Table 13: Usage- Indicators of Significance

Individual	Business	Government
• Average Monthly expenditure on - Internet Access - Cell phone - Telephone • Per Capita Net State Domestic Product	• Share companies using - ISDN - VSAT	• Status of accessibility of the information and services by the citizen • Proportion of Policies taken for ICT Usage • Total number of e-Governance projects undertaken.

The States have been categorised in six levels according to their usage scores in Table 14.

Table 14: Categorisation of States/UT's based on Usage Score

Levels	States	Number of States
Level 1	Delhi, Chandigarh, Kerala, Karnataka, Haryana, Tamil Nadu	6
Level 2	Gujarat, Punjab, Andhra Pradesh, Maharashtra, Mizoram, Goa, West Bengal, Rajasthan	8
Level 3	Chattisgarh, Himachal, Sikkim, Meghalaya, Uttar Pradesh, Uttaranchal, Lakshadweep	7
Level 4	Jharkhand, Pondicherry, Orissa, Madhya Pradesh	4
Level 5	Andaman & Nicobar, Arunachal Pradesh, Jammu & Kashmir, Daman & Diu	4
Level 6	Manipur, Dadra & Nagar Haveli, Assam, Bihar, Tripura, Nagaland	6

The region-wise distribution of the Usage Sub-Index score levels is presented in Table 15.

Table 15: Regional Distribution of States/ UT's based on Usage Sub index

Region	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Total
Central	0	0	2	1	0	0	3
East	0	1	0	2	1	1	5
North	3	1	2	0	1	0	8
North- East	0	1	2	0	1	4	8
South	3	1	1	1	1	0	6
West	0	4	0	0	1	1	5

In this category more States are in the above - average level (Level 4) than the other two categories. However, seventeen States are still below average. The relative standings of all three categories show that there is a lot yet to be achieved in terms of balanced regional development of ICT.

2.10 Relationship between Per Capita Net State Domestic Product and e-Readiness Index and its Components

An attempt has been made here to approximate the e-Readiness of a State through a single measure. Thus, it would be an interesting exercise to see the relationship between a broad measure like per capita income and such an index. We wanted to find out whether there is any

relationship between a measure of well being and e-Readiness. As Table 16 and Figures 6 to 8 show, the association between the e-Readiness Index and its components and per-capita income is positive and the association is particularly strong for the Readiness Sub-Index. This implies that States with higher per capita net state domestic product are more ready to harness the potential of e-Readiness. However, note that the direction of causality cannot be established from the above figures.

Table 16: Correlation Coefficients between Per-Capita Net State Domestic Product and Composite Index and its Components

	e-Readiness	Environment Score	Readiness Score	Usage Score
Per-Capita Net State Domestic Product	0.569	0.519	0.658	0.384

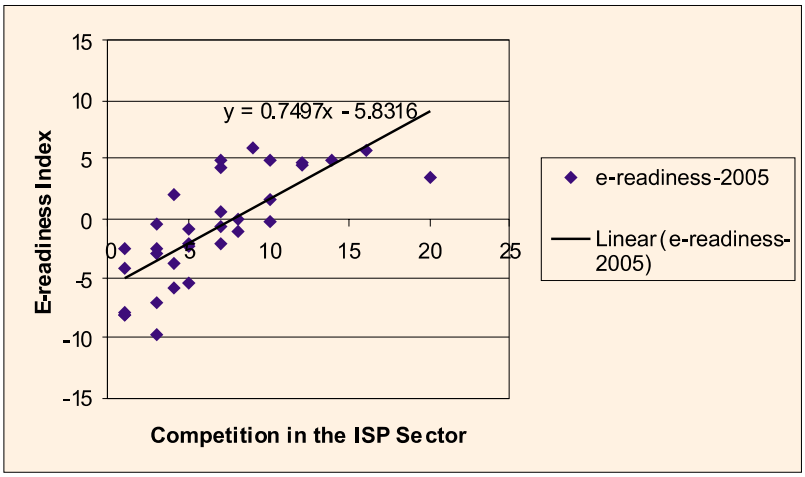
2.11 Relationship between Competition in the ISP Sector and e-Readiness Index.

Theoretical literature on markets suggests that increase in competition among the sellers enhance consumer welfare. So it would be an interesting exercise to determine whether the competition in the ISP sector has had an effect on the e-Readiness of the States. Figure 6 portrays a positive and significant relationship between competition in the ISP[4] sector and the e-Readiness scores of the States. Thus, ERI is seen to increase steadily as the competition in the ICT sector increases. Therefore, a policy of increasing competition in the ICT sector makes services more affordable which in turn results in increased usage by the key stake holders-individuals, businesses and Government.

2.12 Relationship between e-Readiness Rankings and Enrolment Ratio in Secondary Schools (Rankings) Across States

As we have already seen, Education is an important factor in determining e-Readiness across States. Here, we investigate the relationship between the enrolment ratio ranking of States and their e-Readiness rankings. The National Productivity Council has brought out a *State Competitiveness Report* which ranks the States according to various components of competitiveness. While ranking the States in terms of *Human Resources Competitiveness*, the rankings according to enrolment ratios in secondary schools have been calculated. The rankings have been provided separately for the *bigger* (Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala,

Figure 6: Relationship between Competition in the ISP Sector and e-Readiness Index



[4] We have used number of players in the ISP sector as a proxy variable for competition in this sector.

Figure 7: Scatter Plots Showing Relationships between Per Capita Net State Domestic Product and Composite e-Readiness Index and Sub-Indices

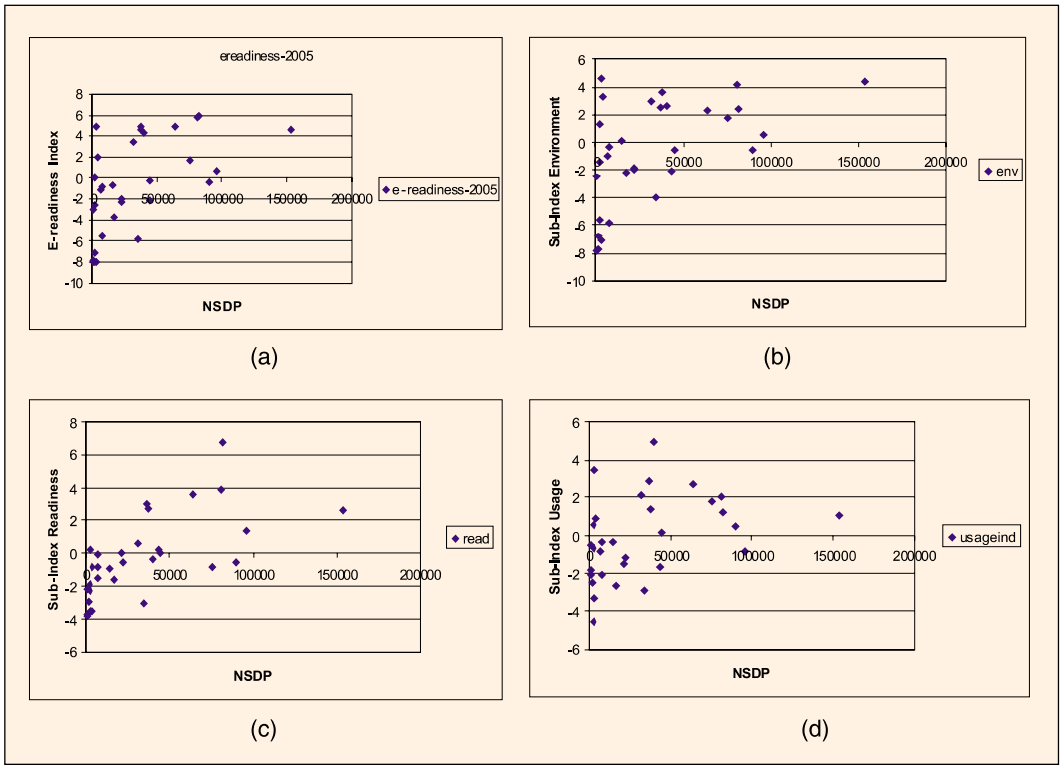
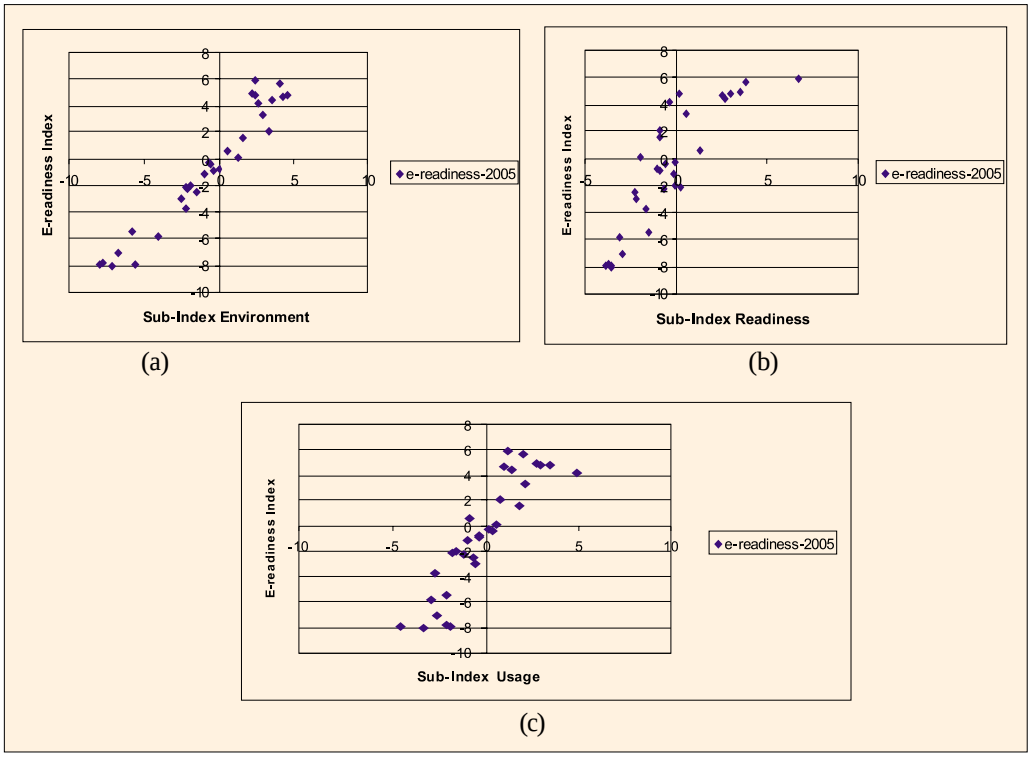


Figure 8: Scatter Plots Showing Relationships between Composite e-Readiness Index and the Sub-Indices



Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal) States and the *smaller* (Arunachal Pradesh, Chattisgarh, Delhi, Goa, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Uttaranchal) States. Table 17 shows that the co-relation among ranks of e-Readiness and secondary enrolment ratios is stronger for the larger than the smaller States. This shows that the larger States have been able to harness the benefits of Education to enhance their e-Readiness more than the smaller States.

A very strong positive relationship between the e-Readiness score and its components is depicted in Table 18 and Figure 8. This is to be expected, as the justification for adopting this framework was that environment should drive readiness and consequently usage would be the reflection of e-Readiness. These three aspects together make a state "e-ready".

Table 17: Correlation between e- Readiness Ranking and Secondary Enrolment Ratios

	Enrolment Rankings	
	Bigger States	**Smaller States**
e-Readiness Rankings	0.45357143	0.145455

Table 18: Correlation Coefficients between e-Readiness Index and its Components

	Environment score	**Readiness score**	**Usage score**
e-Readiness Score	0.969	0.864	0.898

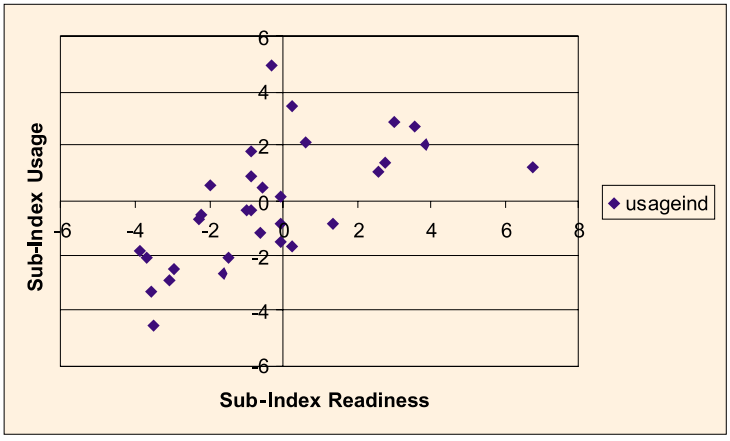
2.13 Relationship between Usage and Readiness

As hypothesised, the readiness and usage score of a State should move in the same direction. A State having a high degree of readiness should be able to transform this ICT capability into higher usage. Table 19 and Figure 9 show a positive relationship between the two. This implies that States with a higher degree of readiness are also the States with higher usage.

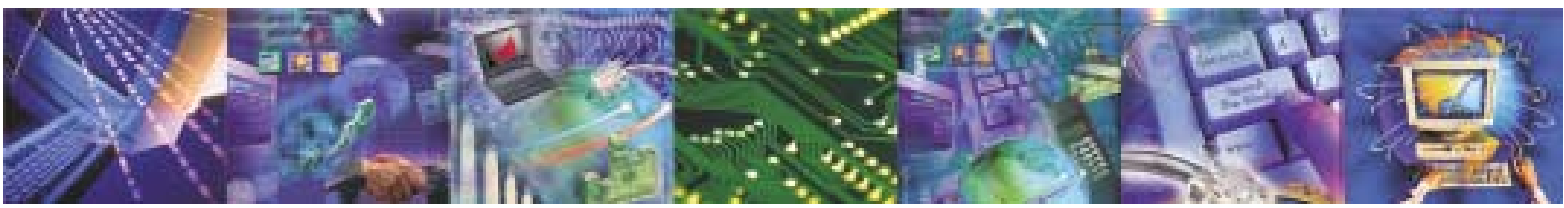
Table 19: Co-relation between Readiness Score and Usage Score

	Usage score
Readiness score	0.638

Figure 9: Scatter Plot Showing the Relationship between Readiness and Usage Sub-Index Score



Comparison of Rankings



CHAPTER THREE

Comparison of Rankings

3.1 Introduction

For the past three years, States have been ranked according to their e-Readiness status. This yearly exercise has assumed importance over the years as the Government of India accords it considerable importance as a stock taking mechanism; to understand the situation regarding e-Readiness or preparedness of the States. The States have also realised the importance of the report, a fact reflected in the quality of data that has been forthcoming in the recent past. Availability of rankings for three years for States and Union Territories logically suggests a need for a comparison of the status of e-Readiness. A note of caution before we embark on such an exercise: The rankings are not strictly comparable, the Framework of Analysis has changed between 2003 and 2004. However, the rankings for 2004 and 2005 are directly comparable since the Framework of Analysis was exactly the same in the two years.

The Framework of Analysis used in 2004 and 2005 has evolved from our exercise in 2003, feedback received from the concerned States and Government departments, and in light of latest developments in the international arena regarding e-Readiness. In 2003, the e-Readiness Index was calculated based on the following six groups (sub-indices):

- Network Access
- Network Learning
- Network society
- Network Economy
- Network Policy
- e-Governance.

These groups in turn consisted of various sub-groups or indicators. The Networked Readiness Framework 2003-2004, however, used a framework that was different, in tune with the evolving methodology and feedback from participating states 1and experts. In 2004, therefore, we changed our framework to factor in the evolution and also for broad compatibility with the evolved system. This framework, described in detail in Chapter 2, has also been used because of its potential not only to evaluate a State's relative development and use of ICT but also to allow for a better understanding of a State's strengths and weaknesses with respect to ICT. As mentioned in the introductory chapter other frameworks lacked this virtue.

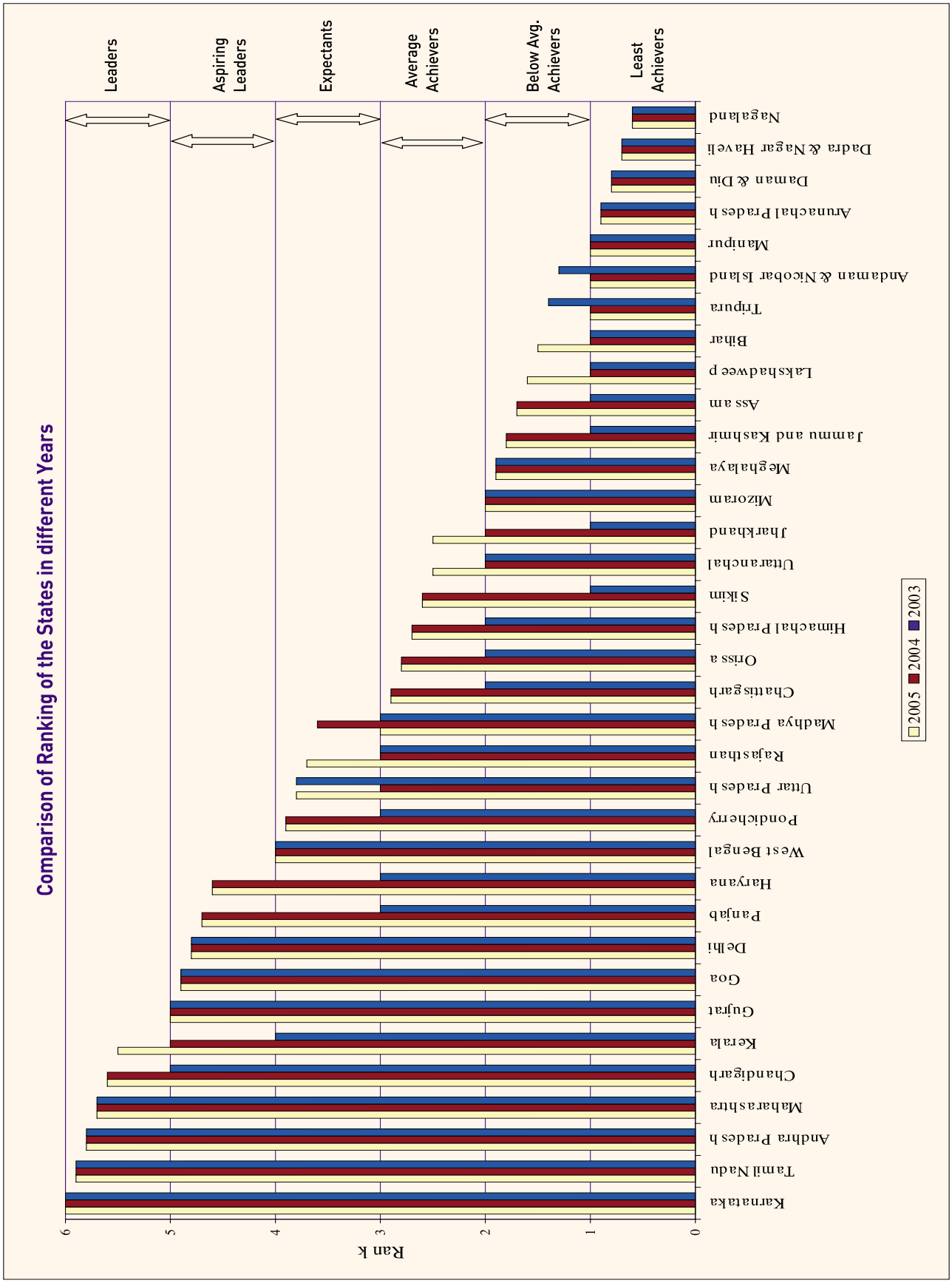
Even though the Framework was the same in 2004 and 2005, the number of variables included in the analysis has increased between the two years. Keeping these limitations in mind, this chapter starts with the comparison of rankings over the last few years. This should give us a fair idea about how the States have fared in the area of e-Readiness. Since the Framework of Analysis is similar for the years 2004 and 2005, a detailed comparison of the rankings of sub-indicators is also undertaken for these two years. This allows us to identify certain factors that have led to the change in ranking of a State relative to others. Finally, using this analysis, we attempt to identify key drivers of e-Readiness. States that have done poorly can concentrate on these factors to improve their e-Readiness.

3.2 Comparison of e-Readiness Rankings 2003-2005

Table 20 depicts the ranking of the States and Union Territories between the years 2003 and 2005.

Table 20: E-Readiness Rankings

State & UT	2003	2004	2005
Andaman & Nicobar	24	31	31
Andhra Pradesh	4	3	1
Arunachal Pradesh	31	30	30
Assam	25	23	25
Bihar	28	32	28
Chandigarh	8	5	5
Chattisgarh	19	16	16
Dadra & Nagar Haveli	35	34	34
Daman & Diu	33	33	35
Delhi	7	9	8
Goa	6	8	10
Gujarat	5	7	11
Haryana	15	11	9
Himachal Pradesh	17	19	17
Jammu & Kashmir	29	22	27
Jharkhand	26	26	22
Karnataka	1	1	3
Kerala	11	6	4
Lakshadweep	27	27	26
Madhya Pradesh	12	14	21
Maharashtra	2	4	6
Manipur	34	28	29
Meghalaya	23	24	24
Mizoram	21	21	23
Nagaland	32	35	32
Orissa	20	17	20
Pondicherry	14	13	13
Punjab	13	10	7
Rajasthan	16	20	14
Sikkim	30	18	19
Tamil Nadu	3	2	2
Tripura	22	29	33
Uttar Pradesh	10	15	12
Uttaranchal	18	25	18
West Bengal	9	12	15


Comparison of Ranking of the States in different Years
Leaders
Aspiring Leaders
Expectants
Average Achievers
Below Avg. Achievers
Least Achievers
Rank
0
1
2
3
4
5
6
2005
2004
2003
Karnataka
Tamil Nadu
Andhra Pradesh
Maharashtra
Chandigarh
Kerala
Gujrat
Goa
Delhi
Panjab
Haryana
West Bengal
Pondicherry
Uttar Pradesh
Rajasthan
Madhya Pradesh
Chattisgarh
Orissa
Himachal Pradesh
Sikim
Uttaranchal
Jharkhand
Mizoram
Meghalaya
Jammu and Kashmir
Assam
Lakshadweep
Bihar
Tripura
Andaman & Nicobar Island
Manipur
Arunachal Pradesh
Daman & Diu
Dadra & Nagar Haveli
Nagaland

As we can see from the above table, the southern and the northern States, along with Sikkim from the North-East, have done exceedingly well over the three-year period. Among the southern States, Andhra Pradesh and Kerala have done exceedingly well. Andhra Pradesh's ranking went from number 4 in 2003 to number 1 in 2005. Kerala had even a more dramatic improvement – from 11 to 4. In Andhra Pradesh, initiatives like Rajiv Internet Village (RAJiv) launched in 2004 seeks to provide a host of services to the rural populace through its 22,000 kiosks. The State Government has also taken proactive steps like attractive investment promotion policies. Due to these measures it is estimated that Andhra Pradesh would capture 33 per cent of the national IT and IT enabled services market by 2009. Andhra Pradesh has also done exceedingly well in the Environment and Readiness indicators.

Kerala has a lot of potential to harness the benefits of ICT. Availability of good technical manpower, requirement of fewer licences and recognition of software as an industry receiving all the benefits accorded to a priority industry and investment allowance, has made the State an attractive destination for investors. The Internet services at Kochi and Thiruvanathapuram, and Software Technology Park at Thiruvanathapuram with all world-class facilities provides excellent support especially for export oriented units.

Among the northern States, Haryana and Punjab have improved their rankings significantly, over the three-year period. As can be seen from Table 20, both Haryana and Punjab have climbed six places, between 2003 and 2005. Gurgaon in Haryana has been the IT destination in the North. Almost all big names in the IT sector have their presence in this town. The Government of Haryana has been proactive in having an IT Policy, Web Policy, a number of incentives to software firms and an e-Governance Policy to provide effective governance to business and people.

Punjab has ranked one, among the northern States in terms of over all performance of the States in the last two years. This is an indication of performance of the State in all spheres. The government of Punjab seeks, "to use Information Technology towards accelerated overall development of a knowledge rich society". They have policies for private-public partnership (PPP), other than a separate IT Policy.

Sikkim has had a dramatic rise from 30 to 19 (Table 20) between 2003 and 2005. Forty Community Information Centres (CICs) have been set up across the remotest of regions in Sikkim. The Government uses IT in almost all its functions. Sikkim has among the highest IT usage across Indian States. A Software Technology Park providing higher bandwidth facilities to potential investors has been functional for the last six months.

Among the States showing a downward trend in e-Readiness rankings, Madhya Pradesh has significantly slid down nine places between 2003 and 2005. Most of the decline, however, was between 2004 and 2005 (7 places). Some reasons for this decline are discussed in the next section. Certain other States and Union Territories like Andaman & Nicobar Islands and Tripura show a downward trend in e-Readiness rankings but the significant change happened between 2003 and 2004 when the Framework of Analysis changed. Since there is no concrete mechanism to separate the factors that led to the change in rankings for this State and Union Territory due to poor performance and factors that affected the rankings due to the change in framework, these cases are not discussed.

3.3 Comparison of e-Readiness Rankings 2004 – 2005

Tables 21 through 23 depict the rankings of the States in terms of the Sub-Indices, Environment, Readiness and Usage.

Table 21: Comparison of Environment Sub-Index Rankings

States	Environment 2004	Environment 2005
Andaman & Nicobar	32	33
Andhra Pradesh	9	9
Arunachal Pradesh	30	32
Assam	23	25
Bihar	35	26
Chandigarh	1	1
Chattisgarh	11	15
Dadra & Nagar Haveli	31	34
Daman & Diu	34	35
Delhi	17	7
Goa	2	5
Gujarat	4	11
Haryana	7	6
Himachal Pradesh	24	16
Jammu & Kashmir	19	28
Jharkhand	25	22
Karnataka	12	10
Kerala	6	8
Lakshadweep	27	29
Madhya Pradesh	18	24
Maharashtra	8	2
Manipur	29	30
Meghalaya	22	20
Mizoram	21	23
Nagaland	33	27
Orissa	16	21
Pondicherry	10	12
Punjab	5	4
Rajasthan	26	18
Sikkim	14	14
Tamil Nadu	3	3
Tripura	28	31
Uttar Pradesh	15	13
Uttaranchal	20	19
West Bengal	13	17

Table 22: Comparison of Readiness Sub-Index Rankings

States	Readiness 2004	Readiness 2005
Andaman & Nicobar	33	33
Andhra Pradesh	1	1
Arunachal Pradesh	28	32
Assam	19	23
Bihar	32	29
Chandigarh	11	11
Chattisgarh	27	21
Dadra & Nagar Haveli	34	35
Daman & Diu	31	34
Delhi	3	15
Goa	13	19
Gujarat	7	20
Haryana	10	8
Himachal Pradesh	16	18
Jammu & Kashmir	24	22
Jharkhand	25	17
Karnataka	5	3
Kerala	6	4
Lakshadweep	26	9
Madhya Pradesh	12	10
Maharashtra	4	6
Manipur	29	27
Meghalaya	15	26
Mizoram	20	28
Nagaland	35	30
Orissa	17	12
Pondicherry	22	24
Punjab	8	5
Rajasthan	18	13
Sikkim	21	25
Tamil Nadu	2	2
Tripura	30	31
Uttar Pradesh	14	7
Uttaranchal	23	14
West Bengal	9	16

Table 23: Comparison of Usage Sub-Index Rankings

States	Usage 2004	Usage 2005
Andaman & Nicobar	26	26
Andhra Pradesh	5	9
Arunachal Pradesh	34	27
Assam	23	32
Bihar	24	33
Chandigarh	6	2
Chattisgarh	14	15
Dadra & Nagar Haveli	35	31
Daman & Diu	29	29
Delhi	9	1
Goa	29	12
Gujarat	9	7
Haryana	13	5
Himachal Pradesh	12	16
Jammu & Kashmir	3	28
Jharkhand	17	22
Karnataka	33	4
Kerala	21	3
Lakshadweep	1	21
Madhya Pradesh	2	25
Maharashtra	20	10
Manipur	15	30
Meghalaya	10	18
Mizoram	22	11
Nagaland	27	35
Orissa	18	24
Pondicherry	4	23
Punjab	7	8
Rajasthan	28	14
Sikkim	19	17
Tamil Nadu	8	6
Tripura	30	34
Uttar Pradesh	16	19
Uttaranchal	31	20
West Bengal	11	13

As we have already mentioned that comparison of rankings between 2004 and 2005 is more appropriate than the comparison between 2003 and the other years due to difference in the Framework of Analysis used in those years. In this section we take a closer look at the rankings in 2004 and 2005 since these are directly comparable. Therefore, we can go down to the level of Sub-Indices to isolate the factors responsible for significant shift in rankings.

Before comparing the 2004 and 2005 ranking of States, it might be instructive to look at the drivers of the leaders in improvement across the three years. Andhra Pradesh's performance in both Business and Individual Readiness are much better as compared to other States. Improvements in the Readiness and Usage indicators have helped Kerala climb up the ladder of e-Readiness rankings. In both these indicators the performance of Kerala in terms of individual and Government components has been better than other States. Haryana has done well in Environment and Usage indicators as compared to other northern States and Punjab has performed well in Political and Regulatory Environment and Individual Readiness Indicators. Among the North-Eastern States, Sikkim has done well in Political Regulatory and Infrastructure Environment Indicators.

While comparing the rankings for 2004 and 2005, it can be observed from Table 20 that the States of Bihar (up four places), Jharkhand (up four places), Rajasthan (up six places) and Uttaranchal (up seven places) are the States which have significantly improved their positions between the two years. On the other hand, Jammu & Kashmir (down five places) and Madhya Pradesh (down seven places) have declined significantly during the same period. In order to find plausible factors behind such changes we need to probe deeper and go to the level of Sub-Indices.

Bihar has significantly improved in indicators representing Market and Infrastructure Environments and Readiness of both the Business and Individual varieties in 2005 over 2004. Jharkhand, on the other hand, has done exceedingly well and had improved its ranking through good performance in Political, Regulatory and Infrastructure Environment Indicators as well as Readiness on the part of Government and the Individual. Rajasthan, which is performing well in terms of income growth and poverty alleviation in the past few years, has significantly improved its ranking in 2005 over 2004. The factors responsible for such changes are Political and Regulatory and Infrastructure Environment indicators, Government Readiness Indicators and Individual and Government Usage indicators. Uttaranchal, the State with the greatest improvement in ranking between 2004 and 2005, has done well in Political and Regulatory and Market Environment Indicators, Government and Individual Readiness Indicators and Business and Government Usage Indicators. It is clear that Political and Regulatory, Government Readiness and Government Usage are indicators that have helped most of these States to improve their rankings in terms of e-Readiness between 2004 and 2005.

Among the States who have moved down the e-Readiness rankings, Jammu & Kashmir has performed poorly in Infrastructure and Market Environment Indicators, Business Readiness Indicators and Government Usage Indicators. Madhya Pradesh, on the other hand, has done poorly in Infrastructure and Market Environment Indicators and Individual Readiness and Usage Indicators. Once again, Infrastructure and Political and Regulatory Environment Indicators, Business Readiness Indicators and Government and Individual Usage are the indicators, which have caused the downfall of most of these States.

3.4 Conclusion

The comparison of e-Readiness rankings throws up some important lessons regarding indicators that have caused significant change in rankings of the States and UTs. Political and Regulatory Environment emerges as a significant variable in determining changes in State rankings. This indicator was responsible for improvement

for the States that have done well. It was the chief cause for the others to fall behind.

The analysis in Chapter 2 indicates that policies undertaken for better e-Governance, incentives to IT companies and security policies are significant indicators affecting the political and regulatory atmosphere across States. Thus, States lagging behind should concentrate on quick formulation and efficient implementation of such policies. Government Usage is another factor that turns out to be extremely important. Other significant factors that emerge from the analysis in Chapter 2 are status of accessibility of information and services by citizens; policies taken for ICT usage and, number of e-Governance projects undertaken. Again, the States lagging behind should concentrate on these indicators to improve their e-Readiness vis-à-vis the others. Thus, apart from other factors, policies to enhance e-Readiness emerge as an important factor in explaining the change in rankings of the States. Thus, their Governments should actively formulate policies and implement them in order to increase e-Readiness.

Analysis of Case Studies

CHAPTER FOUR

Analysis of Case Studies

Case studies provide a flavour of how e-Governance is put into action, what works and what doesn't, innovation, design, lessons learnt, etc. They show the ability of the State Governments to conceive programmes for e-Governance. A mix of theoretical frameworks is used to evaluate the new initiatives on offer and how they are different from the existing ones. We would be evaluating the case studies not only on the basis of whether the projects empower an unserved segment of the population or whether adequate value addition is obtained in these projects, but also on the basis of sustainability, scalability and replicability of the project within the State.

Development is a holistic term, which includes conformity with parameters of freedom. One of the important ways of evaluating the role of IT would be to view its role in 'Capability Enhancement'. The evolution of Amartya Sen's 'Capability approach' has it roots in the development discourse that has been the hub of ever-changing ideas. The indirect role works through the contribution of capability expansion in enhancing productivity, raising economic growth, broadening development priorities, and bringing demographic changes more within reasoned control. The direct importance of human capability expansion lies in its intrinsic value and its constitutive role in human freedom, well being and quality of life. It treats human beings as goals/ends in themselves and not merely as a means to securing higher income and growth. Development, in this view, is the process of expanding human freedoms, and the assessment of development has to be informed by this consideration.

Thus, what is extremely important while judging policies or programmes is their ultimate impact on human capabilities and not just the impact on economic growth. What is important is whether the unserved or underserved are being catered to or empowerment of the marginalised section is happening. This is essentially the policy implication of the Capability Approach. It is suggested that the holistic view of development provided by Sen's capability approach justify its adoption for the current analysis.

Brown's (1991) information-based evaluation methodology is sensitive to context-specificity and looks at whether value is added to the information or whether information is being used to realise either tangible or intangible benefits.

The 'Sustainability' aspect of the e-Governance project is examined by examining whether the initially 'attractive user charges' are sufficient to earn an Internal Rate of Return (IRR) equivalent to the cost of subsidised capital inputs. When the User Density increases or matches the threshold level, User Charges become an attractive proposition to earn an IRR equivalent to the cost of unsubsidised capital inputs and is thus able to attract private sector participants.

The framework is succinctly traced below:

Table 24: The Framework for Evaluation of ICT Initiatives

Approach	Essence of the Approach	Yardstick to Evaluate Outcome/Output	Indicators
Sen's Capability Approach	Whether unserved, underserved are being catered to or empowerment of the marginalised section is happening	- Increase in productivity - Gender sensitisation - Participation of females - Human development	- Increase in productivity (labour, capital and total factor productivity) - Extent of coverage (Geographical & Income group), - Demographic influences, - Female participation
Brown's Information Based Evaluation Approach	Whether value is added to the information or whether information is being used to realise either tangible or intangible benefits or maximisation of utility of information	- Increase in income, - Reduction in variance of monthly income receipts - Market risk reduction, - Institutional and micro finance availability	- Increase in income, - Improvement in delivery mechanism, - Market risk reduction- e.g. provision of storage space to farmers, e-kiosks for rural banking, covering distance areas, - Proportion of institutional finance in total debt
Sustainability/ Scalability/ Profitability	Ensure that the project is not transitory; should be sustainable with a purposeful mission attached to it such that it serves that cause of the state.	**Sustainability:** Weighted cost of funds for operation of schemes subsidised by the government can be met by even very attractive user charges **Scalability:** would be seen by how far the program can be expanded region-wise/ stakeholders -wise such that IRR meets the subsidised weighted cost of funds **Profitable:** When user charges and user profile reach a threshold level and cost recovery yields IRR that exceeds the weighted cost of capital at non-subsidised rates.	- PPP, - Viability Gap funding, - **Sustainability:** Financial IRR and reduction in viability gap funding over the time period - **Scalability:** IRR equals the subsidised weighted cost of funds. - **Profitable:** IRR is same but weighted cost of funds comes down due to economies of scale and scope.

Caveat

No field survey to identify the impact of the e-Governance initiative was conducted across the country as it was not within the scope of the report. Care was to taken to include those initiatives, which have been in operation for more than a year as these are expected to last through the initial period.

Case Study 1:

Akshaya –An IT dissemination Project
An Initiative of the Kerala Government

The Akshaya project is the first district wide e-literacy project in India and one of the largest known Internet Protocol (IP) - based wireless networks. It leverages the comparative advantage of Kerala's high rate of literacy and "progressive" social framework along with an already advanced telecom infrastructure. It aims to achieve the twin goals of social development through access to computers in rural areas and financial viability through market - driven entrepreneurship.

However, tension between these goals within the State, and for entrepreneurs and potential consumers makes it difficult to run a financially sustainable ICT kiosk project that also meets social development goals. The difference between consumers and entrepreneurs' perceptions and the ways in which each group defines and prioritises social development and financial sustainability complicates the implementation of the project.

Also experiments of creating entrepreneurship through "Franchise Model" and looking at the programme as another avenue of "employment creation" were self-defeating.

4.1.1 Background

Nearly 1.5 million Malayalees live outside India and they send home more than $785 million a year by way of remittances (Zachariah, *et al* (1998). This is especially so in Malappuram district which has the highest rate of emigration. Since most of the overseas based workers leave their families behind in the villages, there was an emerging demand for Internet-based personal communication services. Also, basic education was considered a bonus for migration, but it was increasingly felt that, even for small jobs, some computer skills could enhance employability. Hence, the demand for the Akshaya initiative originated from the local communities.

Akshaya Initiative-Community demand sparked off the initiative

The Akshaya project in rural Malappuram has been designed to leverage Kerala's unique strengths - active community organisations, 'progressive' social framework, advanced telecom infrastructure and widespread media penetration. It is the first district-wide e-Literacy project in India, and one of the largest known Internet Protocol (IP) - based wireless networks. The Akshaya project was implemented by the IT Department, Government of Kerala, to extend the benefits of ICTs to all citizens. It was a public-private collaboration to impart basic computer training to at least one representative from each household as part of its mass e-Literacy drive. In the first phase, it would impart e-Literacy to at least one member in each of the State's 6.4 million families. The second phase of the project had very ambitious objectives of creating and leveraging IT infrastructure in the State for e-Governance.

4.1.2 Key Objectives

- To develop networked Multi-purpose Community Information (Akshaya) Centres to provide ICT access to the entire population of the State
- To make at least one member in each family e-Literate
- To develop infrastructure to provide sustained e-literacy and other facilities like email and Internet telephony
- To accelerate the development of local content relevant to the population.
- One of the primary differences between Akshaya and other projects is its scale of operations. It covers the 33 million population of Kerala and aims at making 6.5 million persons e-Literate.

Thus, the Akshaya project has three focus areas:

1. Facilitate the access to technology for all sections and regions;

2. Develop competence and skill-sets to enable use of IT by all sections of society, and,
3. Content provision in Malayalam on topics of local relevance.

4.1.3 Project Formulation/conceptualisation at the Grass root level

Akshaya had a grassroots beginning. The seed of the project was sown when the village councils (panchayats) in Malappuram, northern Kerala, approached the Information Technology Minister in April 2002 with a proposal of setting up Government-backed computer education programmes. This was mainly because local computer education "shops" were charging exorbitant prices from the citizens for computer usage, email, chat and phone calls. The proposal was sent to the IT Mission specifically set up to harness the IT opportunity for Kerala. The Panchayats were also ready to contribute funds for the "one computer literate per family programme" designed by the IT Mission. Thus, it was decided to set up a network of tele-centres that could provide a range of ICT based services to rural citizens and Malappuram was used as the initial test-bed, with the end goal of replicating the project throughout the state. The idea was to layer the computer training with a State-supported network of public computing points, so that people had the opportunity of taking their learning to the next level.

4.1.4 Business Model

The Akshaya project was conceived as a Public-Private Partnership (PPP) but the panchayats were extensively involved in the implementation of the project. The programme had two primary elements: Government - subsidised e-literacy training for one member of each household in Kerala, and, an ongoing partnership with local entrepreneurs to provide public access to ICTs, Internet connectivity and services through Akshaya centers.

4.1.5 Selection of Location

The selection of the location was based on multiple criteria. Easy access to the Centre was the major consideration - the Centre was to be available to a family within a maximum distance of 2 Km. While identifying new locations, existing computer centres were considered for conversion into Akshaya centres based on suitability of location. The selection of location also involved checking the availability of power and telephone connections.

4.1.6 Selection of Entrepreneurs

The chief criteria for selection of entrepreneurs to run the Akshaya project was the candidate's previous entrepreneurial experience, IT familiarity and local knowledge. The aptitude of the person and his ability to invest the requisite capital for the venture as well as the entrepreneur's commitment were other considerations.

The local bodies selected the entrepreneurs through interviews. The selected candidates underwent a training programme, which acquainted them with the objectives and methodologies of running the Centre.

4.1.7 Role of State Government and Entrepreneurs

The State Government managed the Akshaya project through the Kerala IT Mission (KITM); village panchayats were responsible for running the kiosks in coordination with the district administration. Private entrepreneurs run the Akshaya centres with technical support from the Akshaya network management team deployed in the district headquarters.

The departments / agencies involved in the project are:

S.No	Name of the Department/Agency	Roles and Responsibilities
1	Kerala State Information Technology Mission	Conceived the project, Campaign and Overall Coordination
2	Local Self Government Department	Coordination of Local Bodies
3	District panchayats/ Corporations/ Municipalities/ Block Panchayats/ Gram Panchayats	Funding, Project Implementation and Monitoring
4	Town and Country Planning Department	Spatial Mapping for the Selection of Locations of Akshaya Centres
5	Public Relations Department	Public and Media Relations
6	Centre for Development of Imaging Technology	Course Ware Development
7	STED Project	Entrepreneurs Training and Support
8	Information Kerala Mission	Local Body Co-ordination, Seminars and Social Animator support
9	CDAC	Connectivity Implementation and Coordination

Phase I- During this phase, the centres were supposed to focus only on e-literacy and the entrepreneurs were engaged in door-to-door awareness campaigns and activities. They were entitled to State financial support in the form of loans to pay rent and purchase computer peripherals. E-literacy training for the people was also State – subsidised. The village and State Governments paid e-centre franchisees Rs 120 per head towards training, while each recipient of the training paid only Rs 20. It is estimated that 85 per cent of the cost of the training incurred by the entrepreneurs was reimbursed by the State. The subsidy was expected to help in raising mass awareness about the Info-kiosk services throughout the district, while simultaneously ensuring their viability and sustainability.

Phase II- After the first phase of the project, each Centre was supposed to use sound business strategies to achieve financial sustainability. The services at these centres were to include the provision of Government services such as birth and death certificates, electronic payment of bills, education training and access to information on health, agriculture and legal issues.

However, consumers' perception of the State and entrepreneurs, entrepreneurs' perception of the state, and the ways in which each group defines and prioritises social development and financial sustainability complicated the implementation of the Akshaya project.

4.1.8 Phased Implementation

The project started on November 18, 2002. It was to be implemented in two phases: e-Literacy Phase (Phase I) and Product Launch Phase (Phase II).

Akshaya Phase I: Malappuram district in northern Kerala was chosen for the pilot implementation. It is the most populous and only Muslim-majority district in Kerala. The Kerala Government launched the Akshaya project in November 2002. Entrepreneurs were selected by February 2003 and given training. The project went on stream in May 2003. Each Akshaya Centre was allotted on an average 1,000 households- around 630 e- Centres were set up Thus, each Akshaya Centre had an exclusive geographical area for its operation. The Centres trained at least one member from each of the families allotted to them. A remuneration of Rs 140 was paid per trainee. The trainee, in turn, paid Rs 20 to the Akshaya Centre. The rest of the money (Rs 120) came from the gram panchayat, block panchayat and district panchayat.

The e-literacy Programme imparts basic keyboard and mouse skills in 15 hours of training. In addition, it

introduced Windows and word processing to the trainees. About 90 per cent of the families of the district were reached through a network of 630 e- Centres. E-literacy was done through tutor neutral CD-ROM-based content consisting of 10 training modules of 90-minutes each and was distributed to all e-Centres. The modules were played, like videos on PCs, with people watching the process and taking a multiple-choice test at the end of the last module. Every user was assumed to pass the test, and all who went through the process was certified "e-Literate".

Thus e-literacy for the entire district was completed by February 2004–each household in the district had at least one member familiar with basic computing concepts.

Akshaya Phase II: In the second phase, Akshaya Centres were to be used for delivering various e-Governance services to the public, which included Pubic Grievances Redressal Systems, Decision Support Systems, online processing of applications, information dissemination services, digital extension of various campaign/awareness programmes, tele-medicine, agriculture intervention, etc. Many initiatives like e-Parathi (District Collector's Public Grievance Redressal Mechanism), e-Krishi, etc. have started.

In this phase of the project, the State created a wireless infrastructure and the entrepreneurs and the state shared the initial cost of setting up the wireless infrastructure in a 50:50 ratio. In addition, each entrepreneur was to pay a monthly rent of around Rs 1,000 for using the infrastructure. The majority of Akshaya entrepreneurs were apprehensive of the project's future. The business model of the first phase was simple and assured revenue generation. In the second phase, however, they needed to introduce services based on market requirements. Hence, high levels of risk were involved in the second phase and entrepreneurs had already made some investment on which they were hoping to get returns.

Rollout Phase: The project piloted in the district of Malappuram is being replicated all over the State in phases making Kerala the foremost knowledge society in the country and a model of development. The roll out period in the remaining 13 districts of the State officially began from July 2005.

4.1.9 Sustainability Issues

It is essential to assess the sustainability of Akshaya centres and the potential of second phase revenue models as Akshaya is being rolled out State-wide. When Akshaya was first implemented in Malappuram district, 630 centres were established by individual entrepreneurs to serve 1,000 households each. At present, 435 centres remain of which 430 have connectivity. But debt burdens caused by financial losses forced them to shut shop.

In the first phase of the Akshaya project in Malappuram district, the entrepreneurs were reasonably successful because of the certainty of business and State support which flowed through the local bodies. Nevertheless, the problems of the Akshaya project had started in the first stage itself. Some of the practical hurdles that sprang up in the pilot phase were:

- There were many instances of unnecessary expenditure that entrepreneurs were forced to incur. For instance, the "Handbook for Learners" which had a marked price of Rs 10 each sold less than 100 copies at some centres. But each of the centre owners had spent Rs 8,000 or more on stocking this book. They were promised that unsold books would be taken back, but they are yet to be refunded

- Every centre was supposed to train at least 1,000 people in three months, thereby ensuring an income of Rs 1.20 lakh but it took nearly six months. The delay in completing the training was reflected in disbursement of funds as well. This delay itself inflicted a heavy loss by way of extra interest, electricity bills, rent for the building, etc. on the proprietors of the Akshaya centres.

Phase II- The second phase of the Akshaya project envisaged the launching of various IT-related services and linking of Governmental services to Akshaya centres. At the outset it was realised that the second phase was going to be very risky as the entrepreneurs had to act independently and follow the market. And the fear turned into reality. The pioneering vision behind the internationally acclaimed project soon fell apart because of divergent voices about its financial viability. Questions arose about its future as well. It would be pertinent to explore the challenges arising from this simultaneous pursuit of social and financial goals and suggest corrective measures to make this ambitious project a success.

There is tension inherent between the goals of social development and financial sustainability at the macro (within the State and political parties) and micro levels

(with entrepreneurs and potential consumers) making it difficult to run a financially solvent ICT which that also meets development goals. As it turned out, the implementation of ICTs for development is not simply a technical process of delivering services to the poor, but a highly political process involving tradeoffs and prioritisation of particular goals to attain sustainability.

4.1.10 Benefits

Akshaya is a social and economic catalyst focusing on the various facets of e-Learning, e-Transaction, e-Governance, Information and Communication. Since the locations of these tele-centres is strategically planned and spatially distributed to cater to the people in even the remotest part of the district, they form a powerful network to bring the benefits of all e-Governance initiatives to the common man. The telecenters have the potential to provide G2C, G2G, C2C, B2B and G2B services and can act as decentralised information access hubs and service delivery points.

Benefits in Malappuram district

Trained more than 5.9 lakh people, more than 50 per cent of the trainees are women.

Online certification: e-Literacy-5.9 lakh studied, 25,378 certified

e-Vidya- 46,750 studied, 6500 certified

Nearly 3000 direct employment opportunities created.

Computerisation in primary co-operative banks and societies, small shops and business establishments and schools and educational institutions.

Various e-Governance services like e-Payment (bill payment), e-Krishi (agriculture being linked to market), e-Parthi (online bill payment) etc. have enabled the Government to offer its services more effectively.

Even though over 25 per cent of Akshaya centres have closed down, it is inappropriate to term the project a failure. The very fact that 450 centres are functioning across Malappuram, braving the initial unforeseen hiccups, is a tribute to the project. But the State Government, now replicating the project in other districts, should not overlook the problems that these centres encountered. And offering a helping hand to those in trouble, rather than just washing its hands off, would send a positive message to potential Akshaya entrepreneurs in other parts of the State.

4.1.11Analytic Synopsis

Approach	Indicators
Sen's Approach	**Female participation-** E-literacy had some interesting gender-related outcomes. About 65% of the people of the trainees are women, whereas only 11.7% of the entrepreneurs are women. This high rate of female participation in the computer literacy is very encouraging considering the greater net benefit coming from educating women. **Increase in productivity-** This results from the following sources: • By empowering individuals and communities through enhanced access to information, education and communication facilities • By modernising and upgrading skill sets of ordinary citizens and thereby increasing their employability • By reduction in average service processing time in the discharge of government services • By generating content in local language and making it relevant & useful to the common man **Extent of coverage-** The outcome of increased PC and ICT applications penetration has been achieved owing to the following initiatives: By creating awareness of ICT tools & usage. Each e-kendra has been set up within 2-3 kilometres of every household to make available the power of networking and connectivity to common man. Generation of service delivery points even in the remotest areas

Brown's Approach	**Increase in income-** This has resulted from various channels: • By attaining service efficiency and economy in Government services- for instance, e-payment of utility bills (telephone and electricity) through Akshaya centres has resulted in total bill collection of worth Rs 3 crore. • By generating direct investment of over Rs 500 crore in 3 years • By generating over 50,000 employment opportunities in 3 years. **Improvement in delivery mechanism-** Akshaya being a one-stop information centre, has proved to be a social and economic catalyst focusing on the various facets of e-Learning, e-Transaction, e-Governance, Information and Communication. Akshaya has also enabled the integration of communities through the creation of e-networks and development of the core sectors like Agriculture, Health, Education, Industry and Resources. It has also enabled Government departments to identify the services that are routed through its network and helped them to structure the programmes.
Sustainability/ Scalability/ Profitability	Achievement of the twin goals of social development and financial viability has proved to be a major hurdle for the Akshaya centres to become sustainable in the long run. A fresh new look on the situation is necessary to enable this ambitious project to integrate the twin goals-for instance, proper selection of entrepreneurs. Scaling up of the Akshaya centres will yield real benefits only when the sustainability issue of these centres are adequately addressed. As borne out by the pilot experiment, about 3/4ths can be called as financial success while one-fourth of them had shut down their centres.

Case Study 2:

KAVERI
An Initiative of the Karnataka Government

Initially meant only for property registration, KAVERI's scope has been extended to the registration of firms and societies and marriages. Attempts are also being made to successfully link it with the Bhoomi Project so that land records can also be accessed from the SRO (Sub- registrars Office) instead of having to go to taluk offices. The KAVERI project of Karnataka won the best e-Governance Project award for the year 2004 at the 40th annual conference of the Computer Society of India (CSI). Similar initiatives that have been successfully implemented in other states are CARD in Andhra Pradesh, HIMRIS in Himachal Pradesh, and PEARL in Kerala.

4.2.1 Background

The Department of Registration and Stamps in Karnataka had made attempts earlier towards computerisation of their processes. However, there were certain drawbacks in the earlier computerisation process, which led to only partial success. Despite computerisation, the process of registration was time consuming, documents were not delivered on the same day and an integrated software could not be developed. Also, it required huge investment from the Government. Besides, all 201 sub-registries could not be computerised at the same time. According to a moderate estimate, it would have taken a minimum of 10 to 15 years depending on the availability of funds.

Consequent to this assessment, it was proposed to follow the Maharashtra model of e-Governance with the technical help of the Pune-based CDAC to automate the whole registration process on the principle of public-private participation on a Build-Operate-Transfer (BOT) basis for speedy delivery of registered documents to the citizens of Karnataka. The computerisation of the department was important because the Department of Stamps and Registration is the third highest revenue generating department for the Government of Karnataka, with a revenue target of Rs 1,360 crore for 2003-2004. The department has a staff strength of only around 1,000 at 202 offices across the State and spends less than 1.5 per cent of its revenue on itself.

4.2.2 KAVERI- A Business Process Reengineering Model

KAVERI is an example of the Business Process Reengineering (BPR) model to reorient the Department of Registration and Stamps towards 100 per cent automation in the registration process, wherein the registered documents would be delivered to applicant within 30 minutes of document submission in contrast to the existing 45-day time lag.

4.2.3 Key Objectives

KAVERI is the first public-private partnership project to be implemented in Karnataka since 2003. The hassle-free procedure seeks to automate and streamline the workflow. The system aims at providing conclusive proof of authenticity of documents, afford publicity to transactions, prevent fraud, provide a facility for ascertaining whether a property has already been transacted, assure security of deeds and titles in case the originals are lost or destroyed. Moreover, the implementation of the project would pave the way for transparency in the department and enable more effective monitoring. It is also expected that this project would enhance revenue collection in the State and would lead to an improved, efficient and user-friendly administration.

As improvement over the Maharashtra model, the following innovations were introduced:

- Automated kiosks for calculation of the guidance values by the public.
- Computerised token system as against the manual system in Maharashtra.
- Data stored on both CDs and microfilm as against the storage of data on CDs alone in Maharashtra.
- Maximum involvement of departmental staff to: a) facilitate smooth transition from the private operator to the Department once the contract period is over,

and, (b) to run the operations under all exigencies.

- Establishment of the Central Record Room at the head office level and Registrars in districts to ease the space availability in the existing offices, thereby leading towards a paperless office which is an ultimate aim of e-Governance.

4.2.4 Business Model /Revenue Model

The proposed strategy for the project is BOT (Build-Operate-Transfer), wherein a private partner is brought in to install, operate and maintain the hardware across all offices and recover his investments from service fees charged to the client in return of the services being provided. The contract period is five years. The roles of both the business partner and the department personnel are clearly spelt out.

Pune-based C-DAC (Centre for Development of Advanced Computing) has provided the software for the project, while CMS Computers Ltd. (AP Government's e-Seva service provider) and Electronics Corporation of India Ltd. (ECIL) are the service providers for hardware, supporting software and maintenance. While the Government has invested around Rs 1.10 crore on the development of software, service providers have invested around Rs 40 crore on hardware, on data entry and furniture for the system. The service providers are responsible for the execution and administration of the project, including manpower deployment, consumables planning, software installation and site preparation. They are allowed to charge Rs 30 per page as 'scanning fee' from the public. They remit Rs 5 to the Government and keep Rs 25.

4.2.5 New Model

The KAVERI applications suite is devoted to take care of the entire registration process, inclusive of necessary report generation and property valuation. The 80-year-old, five-step procedure of registration was left undisturbed for the benefit of end users who have already adopted it.

The general public was unaware of the requirements to be fulfilled before going to the Sub-Registrar. Therefore each Sub-Registrar was provided a kiosk (with touchscreen interface) also called Citizen Care Centre (CCC), which enables even a computer illiterate person to know the requirements for document registration like market value, stamp duty, registration fee, list of supporting documents, etc. The CCC also posts a list of Frequently Asked Questions (FAQs) and a comprehensive property valuation module that enables the general public to know the cost of their property according to Government rules.

So now, when a person wants to register documents he/she comes to the Sub-Registrar's office and is issued an electronic token, which also assigns a time for the applicant to present documents. The electronic token display system enhances the workflow of the system and the general public is able to attend at a prescribed time instead of waiting for long hours.

The Sub-Registrar then manually scrutinises the submitted documents, decides on their type based on the schedule of the Karnataka Stamp Act and subjects them to PIS-II (Public Information System) scrutiny, which then computerises it. The PIS-II checks the documents based on the information provided and generates a 'Check Slip'. The Check Slip mentions the end result of the documents, whether they would be registered through the system or whether they would be kept pending. Efforts are made to return the documents to the party if they are not complete for registration through the system.

The next step of receipt generation is a simple procedure with the help of a computer, since all fees have already been calculated, details of the presenter given and a number (either pending or normal serial) has been assigned to the document. The system generates a new receipt and all details about receipt are displayed. The operator then enters the details of payment and rechecks the fees calculated with the Sub-Registrar before finalising the receipt. At this stage, the procedure of fee collection is over and operator sets stamp number 2 also called 'Fees Stamp' in consultation with Sub Registrar.

The admission and identification part is processed using Web camera and a finger print scanning device. When all the executors' photographs and thumb impressions are captured, the operator sets Stamp number 3 also called 'Admission stamp' in consultation with the Sub-Registrar. The identification part requires data entry of two witnesses present there. When the identification procedure is over operator puts Stamp number 4 called 'Identification Stamp' in consultation with the sub-Registrar.

After the requirements of the document are completed the Sub-Registrar asks the operator to register the document. The system rechecks all the necessary things before registering the documents and makes all data non-editable. Monthly, quarterly and annual reports are also prepared at the end of month or at specified time as and when required.

4.2.6 Benefits

The kiosks (CCCs) provided adequate information about the documents to be carried to the Sub-Registrar's office and accepts complete documents for presentation, thereby reducing the percentage of pending paper work of department employees. It also reduces the burden on application software in preserving records on hard disk.

Introduction of the electronic token system assigns a particular time to the applicant to present his documents, thus reducing unnecessary crowd gathering in the Sub-Registrar's office and introduces a systematic manner of document registration.

The use of private participation in Government work has enhanced the productivity of the department. The private partners take care of the maintenance and operate the computers as per the guidance of the system, Sub-Registrar and various rules and regulations laid down by the Department. They also scan the document and verify the correctness of the same with the originals and burn the image data on to the CD. This helps in data transmission to the District Registrar's office as per the schedule.

4.2.7 Conclusion

Initially meant only for property registration, KAVERI's scope has been extended to the registration of firms, societies and marriages. Attempts are also being made to successfully link it with the Bhoomi Project so that land records too could be accessed from the SRO instead of having to go to *taluk* offices. KAVERI won the "Best e-Governance Project" award for 2004 at the 40th annual conference of the Computer Society of India.

4.2.8 Similar Initiatives

Similar projects successfully implemented in other States are:

CARD (Computerisation of the Registration Department)	Andhra Pradesh
HIMRIS (Himachal Registration Information System)	Himachal Pradesh
HALRIS (Integration of property registration and land records administration)	Haryana
PEARL (Package for Effective Administration of Registration Laws)	Kerala
SEVANA (Civil registration system)	Kerala
SARITA	Maharashtra

All these projects mark an end to the centuries - old manual system and empower citizens by giving them access to a prompt and reliable response from the Registration Department.

4.2.9 Analytic synopsis

Approach	Indicators
Sen's Approach	**Increase in productivity -**Efficient administration achieved by drastic reduction in the time taken in transaction processing, hassle-free procedure and reduced corruption. All transactions are predefined and hence all operations at the Sub-Registrar's Office are fully automated. In addition, the quality of the services can be enhanced, as the staff can put in more time on creative jobs leaving the monotonous tasks to the computer, which also ensures accuracy, completeness and better output. **Extent of coverage -** CCCs cater to the full range of people (including illiterates) as computer literacy is not essential to use them.
Brown's Approach	**Increase in income-** Enhanced revenue collection for the State Government coming from the nominal fees charged. **Improvement in delivery mechanism-** Through qualitative as well as quantitative enhancement in the department's work culture and creation of paperless office. The project demystifies the registration process, brings speed, efficiency, consistency and reliability to the transactions. **Risk reduction-**Microfilm ensures secured data storage replacing CDs; prevents loss and damage of documents, eliminates need for perusal of bound volumes and facilitates electronic document retrieval.
Sustainability/ Scalability/ Profitability	Being a PPP model, it is self-sustaining as the private partner has to install, operate, maintain the hardware and provide software support. In addition, the departmental staff is also getting trained by C-DAC so as to make the transfer after the contract period easier. PPP model envisages zero spending for the Government, thereby making it scalable. An important aspect of is the imposition of user charges.

Case Study 3:

Implementation of e-Procurement Exchange for Government of Andhra Pradesh

- PPP works best
  - If it combines the skill sets of public and private partners - domain expertise of the Government and software and delivery skills set of the private sector.
  - If risk-return option is chosen by the private sector who is willing and in a position to deploy funds vs. Government which desires a risk free option where only its domain expertise is used
- Open platform-level playing field and "fair" competitive platform for the suppliers
- Smart governance - though increased transparency, monitoring and control of the entire procurement process.

4.3.1 Background

The Government of Andhra Pradesh has an estimated aggregate annual expenditure of Rs. 10,000 crore for procurement of works, goods and services. The traditional system of procurement in Government departments was through the manual mode. This suffered from various problems such as inordinate delays (ranging from 4 to 6 months) in tender processing, heavy paper work, multi-level scrutiny which consumes a lot of time, cartel formation by the contractors, etc. The Government departments are very guarded about the processes and generally do not share the information with other entities, thereby resulting in lack of transparency.

4.3.2 New Initiative

In a scenario fraught with such deficiencies, the need was felt for wide ranging reforms in the tendering process. Accordingly, a Cabinet sub-committee was constituted in 2000 to suggest reforms to improve the procurement processes in Government departments using IT tools.

Based on the IT Act 2000 enacted to provide legal recognition to electronic transactions, the Government of Andhra Pradesh (GoAP) embarked on major e-Government initiatives in 2002 to reap the benefits of IT to deliver good governance to society. As part of these initiatives, GoAP desired to set up an e-Procurement Marketplace, where all the Government departments, agencies and local bodies could undertake procurement transactions with their vendors. Government departments, as well as the suppliers, could conduct their procurement related transactions right from the invitation of tenders to the issue of supply orders in an electronic environment facilitated by Internet technology.

4.3.3 Key Objectives of e-Procurement

The key objectives of the e-Procurement solution are enumerated below:

Demand Aggregation - The ability to aggregate Government departments' demand to leverage buying power with the suppliers

Reduced Inventory Costs - Improved planning and management of inventory leading to lower levels of inventory, thereby reducing costs

Internal Arbitrage - Ensuring consistency in goods and services costs at the best price across all departments at the item level

Consistent and Sustainable Vendor Development - Enabling pre-qualified vendors the opportunity to access other Government departments

Transactional Effectiveness - Eliminating or automating non-value adding steps within the procurement to enable efficient and effective processes

Reduction in Total Cost of Ownership - Understanding the supply chain and life cycle costs in procurement to establish value adding supply relationships leading to reduced cost of doing business for both Government and industry

Effective Tender processing - Use of different types of e-Auctions to get better deals

Open Platform - Level playing field and "fair" competitive platform for the suppliers

Smart governance - Increased transparency, monitoring and control of procurement process

4.3.4 Core functionality of the e-Procurement Marketplace

The Marketplace includes the following core functionality to take advantage of various best practices available in the private sector in order to derive the objectives of the initiative.

- Electronic tendering
- Contract management
- Rate contract based procurement
- Dynamic pricing engine (auction, reverse auctions)
- Search Engines, Announcements and Business News

4.3.5 Business Model

The Government has the domain expertise but does not have the best expertise in software/ Information Technology, whereas the private sector has technology and skill set to convert the manual processes into computerised processes. In view of the technology intensive nature of the project, the PPP model was selected. In this model, the expenditure on hardware and software as well as its customisation is borne upfront by the private partner without any investment by the Government and all the risks related to changes in technologies, volumes of business are also borne by the private partner. The private partner recovers the investments by way of transaction fees paid by the user departments for the transactions carried out on the platform. *Commerce One*, the Nasdaq-listed Internet solutions firm, partnered with GoAP to develop e-Procurement as a joint venture where all the investments were from the former.

4.3.6 Revenue Model

The GoAP has chosen a revenue model for the pilot, wherein the Government departments would pay a fixed hosting fee and transaction fee at a suitable percentage charge on the transaction value payable to the private partner. However, in the roll out phase, a new revenue model is introduced, where every participating bidder is required to pay a transaction fee proportionate to the bid value, with a maximum cap (for tenders with a value of less than Rs 50 crore, the fee payable is 0.04 per cent of the estimated contract value or Rs 10, 000, whichever is less - for other tenders, it would be a lump sum of Rs. 25,000). The transaction fee payable by a bidder is so fixed that it is less than the tender fee charged from the bidders in the manual tender system. The revised revenue model has encouraged the departments and PSUs to participate in the portal as the departments are not required to pay any charges to the private partner.

4.3.7 Phased Implementation

Period / duration of the Project

- RFP issued in March 2002
- Agreement for pilot project signed on June 2002 between GoAP and the Private Partner. Pilot project schedule was for nine months; first three months for implementation and the latter six months for the Pilot operations.
- After successful implementation of the Pilot, the project entered into the three-year Rollout stage. The roll out agreement with the present service provider is valid up to March 2007.

Phase 1: Pilot- A pilot in four selected departments was launched in January 2003 to test the concept in varied departments representing the whole spectrum of Government procurements and then roll it out to other departments. The departments selected for the pilot were the A.P. Government's Works Department, A.P. Technological Services dealing in hardware and software, A.P. State Road Transport Corporation dealing in auto spares, fuels, etc. and A.P. Health and Medical Infrastructure Corporation dealing in drugs, medical equipment, etc.

Phase 2: Roll - Out - After the successful completion of the pilot phase, e-Procurement was rolled out on July 2004 to other departments to cover all procurements costing above Rs 10 lakh. The roll out was phased over a period of three years to include all departments at a mutually agreed schedule. E-procurement is presently implemented in nine departments, 11 Public Sector Undertakings (PSUs), 51 Municipalities and four autonomous institutions. Till February 2006, 12,003 tenders aggregating Rs 33,400 crore have been processed on this platform, making it the world's largest Government-owned portal.

Phase 3: Operations and On- Going Maintenance- In this phase, new functions will be introduced. Value added services such as electronic payment, credit rating, logistics and P-Cards for bidder empowerment are also envisaged and would formulate separate initiatives.

4.3.8 Steps to facilitate Speedy Adoption

Change Management with stakeholders was very critical to the success of the e-Procurement project. The users were slow to adapt to the change during the initial period and the project gained momentum up once the users were comfortable with the new system. Various steps taken to rope in the buy-in of the stakeholders are enumerated below.

High power Steering Committee: Since the mandate was to implement the initiative across several departments, the major challenge was to bring all the participating departments to a common platform and agree to a uniform procedure of procurement. To ensure buy-in of the top management and to resolve procedural issues, a Steering Committee chaired by the Chief Secretary of GoAP, with Secretaries and heads of the five identified departments, IT&C (Information Technology and Communication) department and C1 India (private partner) as members, was constituted. The Steering Committee met once a month during the pilot stage to dwell on all issues in implementation of the project giving required orders and directions so that impediments in adoption of e-Procurement are removed.

Project Champions: Project owners (or project managers) were identified from within each participating department and core groups were formed in the user departments to chalk out effective strategies for facilitating speedier implementation within the departments.

Key officials from the departments and PSUs were trained as Chief Information Officers (CIO) by IIM – Ahmedabad. They function as a bridge between the domain experts and the technology experts i.e., vendors. The CIOs assist the Steering Committee in bringing in necessary legislative and regulatory changes, supplier adoption and streamlining the Government procurement process. The CIOs act as project champions within their department to conduct the Change Management Process and to drive the project.

Involvement of stakeholders: Detailed 'As-Is' and 'To-Be' process studies were carried out involving the important stakeholders, i.e., the departmental users and the suppliers/contractors. Feedback was taken from the Contractors Association of Andhra Pradesh on the processes. The gaps thrown by the 'To-Be' process study were filled by appropriate customisations and the agreed upon process by the stakeholders were mapped on the software.

Training and Workshops: To effectively communicate the objectives and benefits of the project extensive concept selling and training workshops were conducted for both the departmental users and the suppliers.

Helpdesk: A call centre type helpdesk was established to record and address all the issues and concerns of the participants.

4.3.9 Business Process Reengineering

Major re-engineering had to be carried out to re-design the bid submission forms to enable the bidder to submit the data online against the set qualification criteria so as to allow the software to do technical and commercial evaluation of the bids. As soon as the bids are opened online on a stipulated date, the system assesses the responsiveness of bids submitted by the bidders by comparing the qualification data submitted by the bidder in the online form vis-à-vis the set qualification criteria for the tender and provides the evaluator a system generated bid evaluation statement of all participating bidders. The auto bid evaluation has streamlined the bid evaluation process, made it speedier and simple apart from making it less subjective.

4.3.10 Outcome of the Initiative

The e-Procurement project has achieved most of the objectives that it was set-up to achieve:

- Transaction volume of Rs 33,400 crore in three years from over 12,000 tenders on the platform
- Reduction in average tender processing time from an average of six months to 36 days
- Increase in average number of bids received per tender from 3.4 to 4, reflecting an increase in participation from supplier community

- Elimination of *cartelisation* as reflected by a sharp increase in supplier participation in some of the cartelised areas of the State
- Empowerment of small and medium suppliers as they need not visit the department to purchase the tender documents or to submit their bids
- Increased transparency as bids are opened online and bid opening is visible to all the suppliers online
- The system has reduced subjectivity in tender evaluation by building smart forms that do preliminary technical evaluation of bids
- Instant online MIS is available on all the tenders, supplier participation and the results to all the departments and the Government.
- Significant cost savings - above Rs 2,000 crore due to discount quotes
- Elimination of paperwork as the bids are submitted online and the files or documents move in electronic form for required authorisation.
- Empowerment of bidders, streamlining of processes and a strong Management Information System are the other commendable achievements.

4.3.11 Benefits of the e-Procurement System

Transparency: In a e-Procurement system, the tender documents are hosted on the web site for free downloading from the day of publication of tenders; this has eliminated the bidders' dependence on department officials for issue of tender documents. Availability of information online to the bidders has eliminated the human interface with department officials in pre and post tendering activities. This has in fact helped reduce subjectivity and corruption. Information on the transactions, the status of evaluation and award of contracts is automatically made available to the bidders on the portal. Transparency in the procurement processes has improved the Government's image and reduced instances of adverse media reports.

Shortened tender cycle time: Automated work flows and simplification of processes have improved the internal efficiency of procurement departments and significantly reduced the tender lead times from 120 days in the conventional mode to 36 days in the e-Procurement mode. Reduction of lead time has contributed to early completion of projects and reduction of cost overheads to departments as well as to the suppliers.

Cost Saving: The departments reaped significant cost savings - Rs 255 crore (20 per cent reduction in cost) for the procurement transactions done through the exchange during 2003-04 and around Rs 2,000 crore in 2004-05 and 2005-06 due to the competitive environment created by the e-Procurement platform. While the off-line procurement carried out for civil engineering works in World Bank- assisted projects in the State have resulted in receiving tenders which are 10-15 per cent higher than the estimated cost, the online procurement for similar works in other departments done over the e-Procurement platform has resulted in receiving tenders which are 7-10 per cent less than the estimated value of the work, thus saving tax payers' money.

The Government departments have also saved significant amounts (Rs. 3 crore) on advertisement costs for column-centimetres in the media as e-Procurement tender notices are substantially shorter and contain only basic information on the name of works, estimated costs and the URL of e-Procurement site for further details.

Empowerment of Bidders: Earlier, the suppliers had to physically scan several newspapers to keep track of tenders called by the various departments. The e-Procurement exchange makes available all the procurement requests emanating from various departments available to the suppliers at one source free of cost. Due to the project, suppliers are able to participate effortlessly and remotely in the Government's bids, round the clock, enabling them to apply for tenders of a large number of departments at greatly reduced costs of transaction. All the transactions are performed in a secure environment and every bidder is required to use his digital signature to participate in the bidding process on the e-Procurement platform. As of now, 5,929 digital certificates have been issued, which is the highest for any State Government's e-Governance portal.

Elimination of Contractor cartels: The electronic tendering process has been made completely anonymous and only after the opening of bids, does anyone come to know the names of the participating bidders. This has prevented the suppliers from forming cartels and has facilitated wider participation from genuine suppliers. Elimination of supplier syndicates/ cartels ensured a level playing field to suppliers. The supplier is benefited by way of more opportunities and Government departments get the best value for taxpayers' money due to the competitive environment created by e-Procurement.

Streamlining of processes: At the outset, an effort was made to standardise the procurement processes, including forms, practised by various departments, especially for the Works departments. Today, all of them follow common tendering processes and forms for Works tenders. Even these processes are being re-engineered to further improve the efficiency and curtail subjectivity in tender evaluation by the departments. A similar exercise is underway for products as well.

Management information system: The e-Procurement platform has a very strong Management Information System (MIS) component. This has improved the availability of information to the departments for monitoring and reviewing the public procurements. Earlier, collection of information from various procurement entities spread across the State was time consuming and its integrity was doubtful. Now the e-Procurement MIS provides the departments real time quality information. Senior bureaucrats in Government and public representatives have access to the information from this portal at the click of a mouse.

4.3.12 Recognition of the Project

The e-Procurement project won "The Gold award" in the e-Governance initiative category for 2003 from the Ministry of Administrative Reforms, Government of India.

E-Procurement project implemented by the GoAP has won PC QUEST's "Best IT Implementation Award" for 2005 under the "Maximum Social Impact" category in a nation-wide competition.

4.3.13 Conclusion

The initiative has been institutionalised. The stakeholders have witnessed the benefits. There are no instances of any department reverting to conventional paper bids. The initiative sustains without Government budgetary support, as it is implemented on the Application Service Provider model with service charges being paid by the participating bidders. The Government has created an e-Procurement fund to sustain initiatives. By charging successful bidders on the e-Procurement platform the departments can meet their requirements of hardware and consumables for this e-Procurement fund.

4.3.14 Analytic Synopsis

Approach	Indicators
Sen's Approach	**Increase in productivity-** This results primarily through considerable reduction in total time consumed right from the invitation of tenders to the final stage of issue of supply orders. It is a commendable achievement, since delay engenders malpractice. **Improvement in transparency-** Elimination of human interface with departmental officials in pre and post tendering activities has resulted in reduction in subjectivity and corruption. **Shortened tender cycle time-** Automated work flows, simplification of processes have improved the internal efficiency of procurement departments and significantly reduced the tender lead times from 120 days in the conventional mode to 36 days in the procurement mode. Reduction of lead-time has contributed to early completion of projects and reduction of cost overheads to departments as well as to suppliers. **Elimination of contractor cartels-** Anonymity in the electronic tendering process till the opening of bids has prevented the suppliers from forming cartel and facilitated wider participation from genuine suppliers. Elimination of supplier syndicates /cartels ensured a level playing field to the suppliers and this way the genuine supplier is benefited by way of more opportunities and the Government departments have got the best value for the taxpayers' money due to competitive environment created by eProcurement. **Paperless Office-** By making the complete procurement process paperless, this new system ensures that at any point in time, authorised personnel can check the status of a particular transaction. **Extent of coverage-** Greater involvement of the supplier community reflected in the increase in the average number of bids received.

	In terms of social impact, it reduces cartel formations among contractors and suppliers since all the bidding is done online through the portal. It has actually increased the participation from the supplier community since anybody can bid for a tender. This helps empower even the small and medium-sized suppliers.
Brown's Approach	**Increase in income-** The departments reaped significant cost savings of Rs 255 crore (20% reduction in cost) for the procurement transactions done through the exchange during 2003-04 and around Rs 2,000 crore in 2004-05 and 2005-06 due to the competitive environment created by the e-Procurement platform. Advertisement costs also witnessed a significant cut as e-Procurement tender notices are substantially shorter than the conventional ones and contain only basic information on the name of the work, estimated costs and the URL of e-Procurement site for further details. Under e-Procurement, tender fees payable by bidders are lower. **Improvement in delivery mechanism-** Qualitative enhancement results through simplification of procedures, fair competition, quick delivery and greater transparency in the procurement processes, which, in turn, have improved the Government's image by reducing adverse media reports . Now the e-Procurement Management Information System (MIS) provides the departments real time quality information on the procurements. This has tremendously helped the Government departments for monitoring and reviewing public procurements. Earlier, the suppliers had to physically scan several newspapers to keep track of tenders called by various departments. The e-Procurement exchange makes available all the procurement requests emanating from various departments available to the suppliers at one source free of cost. All the transactions are performed in a secure environment.
Sustainability/ Scalability/ Profitability	**Sustainability:** The project has been implemented using the public-private-partnership model (PPP). In this model, the Government neither invested in the hardware, software and customisation of the project, nor did it have the responsibility for maintenance. It is all borne by the service provider. The IT player recovers the investment through the transaction fee paid by the user departments for the transactions carried out on the platform. **Scalability:** Realising the funds constraint of GoAP, the PPP model, for obvious reasons, provides the best answer for scalability of the model. **Profitable:** Earlier, the transaction fee charged was 0.24 per cent of the estimated contract value. Now it has been lowered to 0.04 per cent of the tender fee with slabs to have a maximum cap. This suggests extreme profitability of the project.

Case Study 4:

Nagarpalika

An initiative of the Gujarat Government

- Scalable efficient delivery of public services without the constraint of labour availability for increased scope of services.
- Model replicable across the state as the unit of analysis is municipality, a self contained governing unit.

4.4.1 Background

Vejalpur is one of the urban conglomerates outside the limits of Ahmedabad Municipal Corporation (AMC), but falls within the jurisdiction of the Ahmedabad Urban Development Authority (AUDA) . Currently a "B" class municipality, it is shortly to be designated as "A" class, based on the 2001 Census. General administration, certification/ licensing, taxation, accounts, solid waste management (SWM) and complaint redressal for water supply, street lighting and other services were carried out manually in the municipality. Shortage of staff was an excuse for tardy performance and there would always be a demand for additional recruitment. Citizens suffered from the usual delays and harassment associated with a less responsive and uncooperative municipality. Property tax collection suffered and there was lack of transparency in the system.

4.4.2 The e-Nagarpalika Initiative

In view of the aforementioned deficiencies of the manual system, it was decided to take the assistance of ICT. The e-Nagarpalika was established at the Municipality of Vejalpur in 2003 with an agenda to give citizens an effective delivery mechanism.

4.4.3 Key Objective

" One Spot - Non Stop Convenience at City Civic Centre and Internet"

The major objective of total e-Governance through city civic centres is to treat all citizens like customers of a large corporation. The duties enumerated in the "Citizens' Charter" have been brought under the electronic process and made user-friendly and interactive. The other objective is to establish Citizen Convenience Centres where the citizens can easily access information on services, file complaints and make tax and utility payments.

4.4.4 Services Offered

The Internet provides the most cost-effective method of reaching people. The web not only facilitates speedy information dissemination, but also helps citizens access various services that hitherto require their physical presence. In order to realise the ultimate goals of e-Governance, www.vejalpurnagarpalika.com was launched under this project. While developing the web site, the Government clarified that it would not merely be an information driven web site but also utility driven, so as to act as a window to gain access to the municipality Intranet and local area networks. The content of the web site is also available in the local language.

The various activities and data/information that have been computerised are:

Online Registration and Issuance of Birth and Death Certificates since 1994: The municipality web site provides access to all hospitals to register births and deaths online. The entire operation of collecting the information from the hospitals and maintaining it in the muster records used to be a time consuming affair. Manual record keeping made it impossible to search and deliver the certificates rapidly.

On-line Issuance of Licenses for Shops and Establishments: It was impossible to obtain the licenses for shops and establishments without involving a middleman. Now, the City Civics Center issues licenses instantly. Renewals are also carried out across the counter. The system also enables the municipality to collect the fees for sign boards and hoardings, which could not be collected manually earlier.

On-line payments of all municipal dues: The simplified tax calculation system of more than 40,000 properties has been put on the web for the public to access the

property tax calculation method of any property in the city. Easy access to local banks could reduce tax evasion and increase the collection phenomenally. Therefore, local banks have been connected with the municipality's Intranet to collect taxes. Credit and debit cards further facilitate the process. Manual calculation has been replaced by automation to assess real time demand and collection. This system has increased the efficiency manifold.

On-line monitoring for SWM (Solid Waste Management) Transportation: Every time a container in a ward is lifted for transporting and dumping at the landfill, the information, along with Ward ID, Tractor ID, Driver ID and Container ID, are fed into the computer. This results in effective control on SWM transportation activities and at the same time creates MIS that helps in optimisation of transportation costs.

On-line Complaints Redressal: All 12 wards are connected through the Internet to receive and redress complaints on civic amenities or matters related to taxes. Online complaints filed by citizens are directly received by the chief officer and automatically directed to the concerned officer for prompt action. The monitoring mechanism enables every office to identify problems and coordinate laterally or vertically via Intranet to ensure redress within 24 hours.

Online Information on Infrastructure Projects and Tenders: Online information on infrastructure projects and related tenders in process could attract many well-qualified contractors from all over the country. The bank-to-bank payment procedure has reduced delays and increased the confidence of the contractors. All the pay-ins of the municipality as well as payouts are handled through two banks. Vejalpur has transformed the banks into the municipality's back end. This has fine-tuned the financial management of the municipality so as to upgrade itself to one of the best and professionally managed urban local bodies.

4.4.5 Business Model

The project started in June 2003 and was commissioned in October of that year. It is owned and operated by the State Government. The capacity and skill building exercises were taken up with the help of the vendor, Microsoft Systems, who was involved in software design and development. The municipal employees were trained by the vendor on software applications. The work of keying in the entries of previous years on births, deaths, taxes, etc. was done by operators supplied by the vendor, while the work process was handled by the Municipality's employees. The general administration staff are performing well with the same strength as before. No fresh recruitment, even to fill vacancies created by retirement, was done. The employees were encouraged to implement the double entry accrual- based accounting system.

4.4.6 Revenue Model

The direct source of revenue for the municipality is the fee of Rs. 10 - 20 charged per copy or certificate issued. The indirect revenue is in the form of improved finances, i.e., tax collection, which jumped from 15 per cent to 65 per cent of the existing demand. For example, in Vejalpur, the municipal tax collection in 2000-2003 was below Rs 1 crore, whereas after introduction of e-Nagarpalika, in 2003-04 alone, the collection increased to nearly Rs 5 crore. All other municipalities have also achieved similar improvements. Other sources of revenue – fees for certification, application and licensing - were also maximised. Also, the establishment cost was reduced in municipalities, which resulted in income surplus over expenditure.

4.4.7 Viability and Sustainability

The project was able to recover the initial cost of approximately Rs 20 lakh. With the introduction of ICT, revenue shot up to Rs 3 crore from an average of Rs 85 lakh in the preceding three years. In fact, Rs 3 crore has become the annual target for the past two years. As solid waste, electricity and other complaints are monitored, it leads to considerable cost savings. Ward-level revenue generation is monitored and development cost is proportionate to the revenue collected. Though the project was initially meant to be non-profitable, it turned out differently. The Nagarpalika now has a very small staff of only 17 employees. Civic Centre staff is from Microtech Systems. Due to all these measures, the Nagarpalika has improved its finances:

- Tax collection jumped from 15 per cent to 65 per cent of the existing target.
- Establishment cost reduced to 8 per cent of the budget - a record
- Income surplus over expenditure achieved

- Assurance of reliability of services achieved
- Earlier perception of shortage of staff no more valid; no fresh recruitment necessary even as members retire; staff costs to be reduced over time
- More developmental work taken up; four major services privatised

4.4.8 Phased Implementation

The project was launched in October 2003 in the Vejalpur Municipality. As per the current status, the pilot e-Nagarpalika project launched in the Vejalpur Municipality has been replicated in 116 municipalities of Gujarat State.

4.4.9 Current Status

The table below provides the present situation vis-à-vis the situation before the implementation of the system:

Then (Before Oct. 20th 2003)	Now
Manual, pre-computer	Online
Dependency on the staff at each level	Independent
Discretionary powers, execution	Transparent
Decentralised Database	Centralised Database
People had to go to the municipality for payment or lodging complaints	Anywhere in Vejalpur Civic Centre, banks, Internet & credit card
Manual Interest Calculation	Real time interest calculation
Information available on paper	Information easily available
Information within hold of selected few E.g. Property Tax, file tracking	Transparent for the citizen & accessible to all
MIS used to take long, dependant on EDP	MIS online
Different departments & places E.g. Property tax, vehicle tax trade, LIC	All at City Civic Center (Jan Seva Kendras)
Cluttered restricted atmosphere for Citizen/ Employees	User friendly vibrant atmosphere
Lack of connectivity led to inadequate use of resources, e.g. stand alone computers, inventory	Optimum use of resources
No accountability, Property Name change takes 5 years	Performance monitored online
Manual File movement, Lost Files	Electronic file movement
Data Updation only through EDP, dependency	EDP department now has to only monitor
System forced citizen to be dishonest	Trust of the Citizen
Need to be told for every action, billing, follow-up	Computer does the task, backup, billing calculation

4.4.10 Conclusion

The results achieved have been as follows:

- e-Governance model comparable to any metro city in India
- Administration transformed to being people–centric
- Reduction in delays and increased promptness in delivery of services
- On-line monitoring and control encouraged municipality to go for privatisation of four major services
- On line office administration, monitoring/control mechanisms and service provision introduced; led to time management and paperless office administration
- Three civil centres established for time-bound complaint redressal, service provision and accessibility at fingertips
- e-Governance contributed to the municipality being the first ULB to achieve 100 per cent compliance with the first four steps of MSW Rules 2000
- General administration staff performed well with the same strength as before – no fresh recruitment even against retirement
- Firm step towards implementation of double entry, accrual based accounting system – in progress
- Citizens proud of Vejalpur municipality in terms of transparency, accountability, service delivery and above all, exemplary dedication and team work of the elected wing.

4.4.11 Analytic Synopsis

Approach	Indicators
Sen's Approach	**Increase in productivity:** Increase in labour productivity is evident from the fact that no fresh recruitment is made, the need for which was felt earlier. Existing staff strength proved sufficient for the work. **Promptness in the delivery of services:** By providing access to all hospitals to register births and deaths online, the municipality web site not only contributes to time saving by doing away with the practice of maintaining master records manually, but also make the delivery of certificates faster. Issue and renewals of licenses are done instantly by CCCs leaving no scope for malpractice and intermediaries
Brown's Approach	**Increase in income:** This economic benefit results from the fact that the local banks are connected to the municipality's Intranet to collect taxes. This has eased the access; thereby resulting in reduced tax evasion and increased tax revenue collection. Non-tax revenue (certification fees, licensing fees etc.) has also improved. **Improvement in delivery mechanism:** This information-cum-utility driven web site has led to service efficiency as well as service economy. This not only contributes to citizen satisfaction but also improves the public image of municipality. To substantiate, public access to simplified tax calculation system has eliminated the doubt that others have been assessed with lesser tax and reposed their faith in the system.
Sustainability/ Scalability/ Profitability	The project has proved to be sustainable as it has been able to recover its initial costs very comfortably and in some cases by a great margin. The model can be readily scaled up. The model has proved to be a profitable proposition, though it was not meant to be.

Case Study 5:

E-Agricultural Marketing ("EKVI")

An Initiative of the Madhya Pradesh Government

Competition matters: With e-Choupal's foray and success, the 'Mandis' were getting marginalised. In an attempt to retain the market share of mandis, the Government launched EKVI, using the same ICT and in the process helped the farmer, a key stakeholder.

4.5.1 Background

Mandis are central to the functioning of the marketing channels for agricultural products. They act as a point of contact between farmers and traders. Buying and selling transactions are conducted by commission agents and are based solely on verbal agreements and mutual understanding. The *mandis*, unfortunately, have not worked as optimal procurement channels since the market is created, manipulated and managed by agents. To overcome these deficiencies, Internet - connected kiosks, known as e-Choupals, have been set up by ITC where farmers are provided with the latest weather reports and apprised of local and international prices and best practices in farming. They also serve as procurement and purchase points, allowing farmers to not just sell their produce but also to buy agricultural inputs and consumer goods. This initiative in Madhya Pradesh became an ideal vehicle to communicate directly with the farmers and thereby bypass the inefficiencies arising out of agents' intermediation and collusion. It provided farmers with better information regarding prices and reduced their transaction cost (reduction in travel cost plus losses incurred due to use of the Mandi's manual scales). Thus, e-Choupal not only provided an alternative marketing channel but was also a competition to the existing mandis. Thus, to prevent mandis from becoming redundant, their computerisation was sought by the Government of Madhya Pradesh.

EKVI (e-Krishi Vipanan) is the e-Agriculture Marketing project taken up by the Government of Madhya Pradesh as part of its e-Governance initiative to facilitate the farmers of the State in taking informed decisions for selling their produce. Madhya Pradesh's agricultural marketing framework is unique as it consists of two distinct sets of measures:

- Development and regulation of primary markets, popularly called 'mandis'.
- Regulation of market through a series of legal instruments.

If both the functions performed by the activity centre/ Agriculture Produce Marketing Committee (Mandi) are complementary to each other, it would lead to fulfilment of the provision and objectives of the step. Also, faith would be instilled in the farmers to use the system as well as to get fair returns for their produce. This necessitated efficient, transparent and diligent working of the Mandi office so as to facilitate prompt availability of information, reports, and analysis to the users and seekers. It was, therefore essential to graduate from the present manual process to an ICT enabled process.

4.5.2 Computerisation of Mandis

The Mandi Board started the work of computerisation in one mandi in 2000. But the effort was not successful since an integrated approach was not conceived and there was lack of IT awareness among the mandi officials. In January 2002, the task to study the mandi operations and to suggest the methodology of computerisation was entrusted to the Madhya Pradesh Agency for Promotion of Information Technology (MAP_IT). After a detailed study, MAP_IT suggested the computerisation of all mandis with integrated networking on Build-Own-Operate (BOO) basis on Public-Private Participation (PPP) model. This became the EKVI project.

4.5.3 EKVI Project

EKVI project, the e-Agriculture Marketing project of the Government of Madhya Pradesh, was conceived and executed by the Madhya Pradesh Agricultural Marketing Board (Mandi Board) and Madhya Pradesh Agency for Promotion of Information Technology (MAP_IT) on Build-Own-Operate (BOO) basis with the vendor

consortium comprising SQL Star International Ltd of New Delhi, Zoom Developers of Mumbai and iSmart International of Mumbai. It involves use of ICT for automation of Mandi Board Head Office, 7 Regional Offices, 231 Mandis and their associated Sub-market yards and Nakas (Inter-state barriers) across the State of Madhya Pradesh. Most of the mandis and sub-mandis are located in villages having 6 million farmers with 70,000 licensed traders. The data generated at mandis with regard to agricultural produce, sale, etc. are captured online through smart card terminals, transferred to computers in mandis and transmitted through a communication network to the associated Regional Office (RO) and Head Office (HO) via VSAT. It is then made accessible to the specified Nakas for verification of documents on a 24 x 7 basis.

Thus, MAP-IT's EKVI project provides an essential and reliable support to agriculture - an income generating sector which has been performing short of its potential.

4.5.4 Objectives

The EKVI Project was started with the objective of professionalising and reorganising the agricultural trading business of the Mandi Board through cost-effective digital infrastructure using the latest advancement in ICT. It aimed at collection and delivery of real time information on-line to make operations more effective and totally transparent, benefiting all stakeholders (farmers, traders and Government) and empower them with accurate and timely information for effective decision making. The infrastructure developed is designed to create grain-less mandis by removing the need for movement of agricultural produce from the farmer's premises to the mandis. The enhanced competitiveness of Indian agriculture induced through such a market-led IT - based model is envisaged to trigger a virtuous cycle of higher productivity leading to higher rural incomes and capable of creating and meeting vibrant future market requirements as well as facilitating farmers' risk management.

4.5.5 Business Model

The Business Process Outsourcing (BPO) model is used here since it is the most accepted approach for fast track projects for conserving the public resources and getting the best technical support in ever changing technology scenario. The project is rolled out by the vendor (Consortium of SQL Star International Ltd of New Delhi, Zoom Developers of Mumbai and iSmart International of Mumbai) on Build- Own- Operate (BOO) basis. The vendor is responsible for all project activities from hardware deployment, networking (LAN, WAN, etc.), maintenance and periodic upgradation of hardware/ software to disaster management, running of the system (along with deployment of man power), generation of reports, providing their print outs, taking backups, providing back - up power for running the system, etc.

The advantages of the project being on BOO basis are:

- The vendor undertakes all the investments and recurring expenditure
- Roll out of the project in the shortest possible time
- Technology obsolescence is fully taken care of
- Single responsibility for all services pertaining to the project
- Transparency in operations
- The vendor trains Government staff during the course of roll out

4.5.6 Revenue Model

Since it is a BOO project, the vendors make all the investments and incur the recurring expenditure. They are also responsible for all services pertaining to the project. Users, i.e., the mandis and the Mandi Board pay only for the services rendered as a percentage of the mandi fee collected. Additional returns could be generated with written approval from the Mandi Board from the advertisements made at mandis about the agricultural produce and related items such as fertiliser, seeds, pesticides, farm practices, agriculture produce export order, etc.

4.5.7 Phased Implementation

The Pilot Project was done at the following sites:

- Mandi Board HO, Bhopal
- Mandi Board Regional Office, Indore
- Laxmi Bai Mandi, Indore
- Chhavni Mandi, Indore
- Fruit and Vegetable Mandi, Indore
- Sendhwa Naka

The Pilot Project for EKVI was evaluated and approved by the Mandi Board and the rollout is being undertaken as per approved plans for computerisation.

4.5.8 Technology Description

The vendor has developed the software whose patent (Intellectual Property Rights -IPR) is with the Madhya Pradesh Mandi Board. In addition to covering mandi transactions, the software works on a host of other mandi activities like financial accounting, payroll and establishment, engineering, MIS, elections to posts of mandis functionaries and naka operations. The software is in Hindi but has the English option.

Very Small Aperture Terminal (VSAT) connectivity is used for receiving and transferring of data, reports, etc. from the market yard of the mandi with leased line backup. The VSAT network provides the following services:

- Data Transmission from Mandis to RO and HO
- Data Transmission from RO, HO to the mandis
- Video Transmission

On the VSAT network, data pertaining to the rates and quantity prevailing across the mandis would be broadcast and displayed on a TV screen. A separate electronic board to display rates at the entrance of the mandi is also arranged to facilitate the farmer's knowledge of the rates before entering.

The availability of video streaming facility with interactivity to all the mandis can be effectively used for training farmers on farming methods and also use it as an 'Agro Clinic' when required.
At the same time, advertisements can be broadcast and displayed on the screens across the mandis if required.

In the event of any natural calamity this VSAT-based communication system spread over the whole State would provide a standby to the land based communication systems for use by any other departments/agencies.

4.5.9 Benefits to stakeholders

The benefits accruing to the various stakeholders are:

To the Farmers:

- Availability of latest information on rates, arrivals etc. in various mandis.
- Choice to decide when and where to sell
- Sell the produce at door through e-Trading
- Reduction in losses due to transportation and handling

To the Traders:

- Transparent procedures
- Single window disposal
- Reconciliation of daily sales, accounts, transit permit
- Availability of rates in various mandis will help in offering competitive rates to farmers
- Reduction in transportation losses

To the Mandis:

- Instant reconciliation of accounts, transit permits receivables and payables
- Effectively monitor its activities
- Facilitate implementing contract farming
- Ensure transparency in operations

To the Government:

- Speedy collection, analysis and dissemination of information to farmers and traders
- Improved tax revenue collection by collating this data with commercial tax, income tax, etc.
- Instantaneous access to even remote locations through VSAT connectivity, which can be effectively lead to good governance through dissemination of information.

The development of the e-Mandi module has helped the mandis carry out the transactions outside the mandi premises and effectively capture the transactions as well as provide the information on rates and other matters to the farmers and traders. Also, it has integrated private initiatives to purchase produce in places other than the Mandi, but still obeying the law of the land. The confidence of farmers in the mandi system has improved considerably and the suspicion on private initiatives is reducing once the farmers have come to know that they too are part of the recognised system of the State. The tendency to evade mandi fees has reduced considerably because the traders now know that the automated system is capable of tracing the transactions.

The module covers all the basic procedures of accounting for the mandi, including Cash and other accounting

books, accounts receivable and payable, budget preparation and analysis of income and expenditure statements, and, reconciliation of bank accounts. It also handles tasks related to administration of the mandi-staff details, gradation lists, etc., payroll management and generation, advances and recoveries, pension management, employee's service record and other related reports. The software is useful in preparing the voter's lists of farmers and traders and enables the analysis of voters' profile in a mandi.

Based on the above data the software will generate various physical and financial reports on a daily, fortnightly, monthly and yearly basis. Daily/monthly data for rates/ arrivals would be directly uploaded from the mandi on to the Mandi Board web site. The software at Naka would cross check Anugya Patras authenticity at Naka points.

4.5.10 Highlights of the system

The highlights of the capability of the system are:

- The software can instantly calculate and display mandi arrivals, rates, sales, the fee payable by traders, reconciliation of accounts, transit permits, etc.
- Information super-highway established with VSAT connectivity among various levels located at even remote places for seamless flow of information
- State- of- the- art, three-tier architecture.
- Smart card interface for online capture of information
- Modular in nature

4.5.11 Conclusion

Government–Private participation on BOO basis in IT is a reality now. The 'User Charges' concept is a sustainable model and works without involving huge investment from the Government. The role of MAP_IT, an IT consulting agency, has clearly come out as a catalyst and a facilitator for the success of the project.

The project can easily be replicated in all States/countries, including those that are socially and economically backward owing to the BOO framework which does not demand an initial expenditure from the exchequer.

4.5.12 Analytic Synopsis

Approach	Indicators
Sen's Approach	**Increase in productivity -** This initiative has proved to be successful in improving the productivity potential of Agriculture by enhancing its competitiveness in the trading business and making it more professional. In addition, access to prior information has empowered farmers to take informed decisions and enabled them to improve production. For example, access to prices has enabled the farmers to sell the produce at the right time and at the right place. **Extent of coverage -** The BOO model has not only made the roll out phase easier in the shortest possible time but could also be replicated in educationally and economically backward areas as no initial expenditure is to be made to from the exchequer. **Human development -** This system caters to the farmers and has given them an opportunity to enhance their local livelihoods. Involvement of the farmers in the whole system has resulted in an increase of their self-esteem and has restored their faith in private initiatives. The VSAT- based communication network established in around 400 locations all over the State is also used for educating the farmers on new techniques of farming, use of fertilisers, weather forecast and issue of disaster warnings and communication of any disaster in any part of the State to help bring quick responses to the victims of disasters.

Brown's Approach	**Increase in income-** The model has generated employment opportunities for the locals near their homes, which also helps the vendor to get human resources at reasonable rates. All the stakeholders have experienced a rise in their incomes. The farmers are getting competitive remuneration being paid by the traders; Government is benefitting through increased revenue collections; there has been a substantial increase in the collection of mandis, thereby helping both traders and the mandi. **Improvement in delivery mechanism -** Prompt availability of information, reports and analysis to the users and seekers, reduction in transportation losses, soft benefits like increased transparency in operations and effective monitoring of its activities-all this has substantially improved the delivery mechanism. For instance, quick issue of transit permits and its reconciliation at various Nakas ensures that the State's agricultural produce is not transported without a valid permit.
Sustainability/ Scalability/ Profitability	The user charges concept has made it a sustainable model with no initial expenditure from the exchequer. Being a BOO model, the vendor makes all the investments and recurring expenditure with no initial allocation from the state government. The model has no hassles with regard to replication in other areas.

Case Study 6:

Lokvani-An effort to empower citizens

An Initiative of the UP Government

- E-delivery and e-Governance can be combined with e-Accountability
- Start from district level initiative to go to rural level initiatives. Even a non IT savvy State can start the initiative from district level downwards.
- Aiming at using existing pool of entrepreneurs rather than creating one, provides a risk free environment for the program to succeed.

4.6.1 Background

Sitapur's (Uttar Pradesh) Lokvani is a Service Oriented e-Governance system which attempts to provide efficient and responsive online services to the common people and seeks to increase transparency and accountability in Government procedures. The old, manual system made it mandatory for citizens to visit the district headquarters or tehsil for any simple transaction with the Government and for redressal of their grievances. Due to the bureaucratic and hierarchical model of functioning, even ordinary documents such as birth, death, domicile, caste and income certificates were difficult to obtain and the entire process was time consuming. The conventional administrative mechanisms were constrained by their inability to reach out to most of the citizens and the process of service delivery was marred with red tape. The inadequacies in two such systems are highlighted below:

Tehsil

- Dependence on Lekhpal for land records.
- Delay and corruption in obtaining copies of land records.
- Unnecessary secrecy leading to land scams.

Redressal of public grievances

- Applicant can't track the progress of his application.
- Lack of effective monitoring system for senior officers.
- Problem of approaching the district headquarters from remote places regarding applications/grievances.

The only way out of these issues is to use technology effectively to make governance more accessible to citizens.

4.6.2 New Initiative in Sitapur District, Uttar Pradesh

Lokvani is a step in the aforesaid direction. In Hindi, it means 'voice of the people'. It is a public-private partnership project to provide a single window, self-sustainable, e-Governance solution guaranteeing transparent, accountable and responsive administration for grievance handling, land record maintenance as well as an eclectic mix of essential services. The project was conceived by Mr Amod Kumar, the then District Magistrate, who came up with a model of governance using ICT to manage the delivery of services to all the citizens.

4.6.3 e-Accountability

Lokvani stands out among e-Governance projects as it symbolises the success of the concept of e-Accountability as the next step of e-Governance. While other e-Governance efforts are limited to serving the citizens by providing existing services electronically, Lokvani goes beyond that and makes Government functionaries accountable to the citizens. From e-Delivery and e-Governance, Lokvani tries to ensure e-Accountability and e-Democracy. Now, e-Governance cannot sustain until the common man is empowered to make Government and its officers accountable. Not only does information flow from Government to citizen but the latter too may verify and ask questions if not satisfied. This makes Government accountable to its citizens.

4.6.4 The Lokvani Model : Conceptualisation and Management

The District Magistrate of Sitapur commissioned a study of similar G2C (Government to Citizen) initiatives in

the districts of Jhalawad (Rajasthan) and Dhar (Madhya Pradesh) to assess the strengths and weaknesses of these efforts. Lokvani was accordingly designed to improve upon them.

The Lokvani Society was constituted in order to implement the project autonomously and to reduce bureaucratic hassles. NIC provided the necessary technical knowhow for the project. It was decided that instead of opening new kiosks, existing cyber cafes/computer training institutes should be granted licenses to become Lokvani Centres. This decision was taken to ensure the financial viability and the long-term sustainability of the kiosks. The information related to various departments was made available to the kiosks through a web site hosted on the NIC Delhi web server. The kiosks were given login/passwords to log on to the Lokvani web site. The rate list for the services was finalised and care was taken to ensure that the kiosks follow the prescribed pricing.

4.6.5 Project Objectives

Lokvani's vision is to give strength to governance for combating corruption and putting in place policies and investments to drive public and private sector-led growth and maximise domestic resources available to fund district development strategies. It is a commitment to people to give them transparent, credible and accountable systems of governance, grounded in the rule of law, encompassing civil and political as well as economic and social rights, underpinned by accountable and efficient public administration for multiphase development of the people. The objective of this project is to eliminate the digital divide and connect people to strategy makers in a seamless manner. Thus, in operational terminology, it is making people aware of Government services and world aid available to them. It is delivering qualitative and quantitative information to every person in the administration as well as to every target beneficiary. Its goal is to connect people through Lokvani for raising their living standard by providing health facilities, employment, awareness of human rights, environment to grow, education opportunity, and, corruption free governance.

4.6.6 Service Delivery - Range

The following services are offered through Lokvani Centres:

- Online submission, monitoring and disposal of public grievances/complaints
- Single window services
- Birth certificates
- Death certificates
- Caste certificates
- Income certificates
- Domicile certificates
- Tendering services
- Status of arms license applications
- Information about local employment opportunities in the district
- Availability of land records (Khataunis) on the Internet
- Information about Government works, schemes, expenditures, beneficiaries (GPF Account details of basic education teachers, details of work done under MPLAD/Vidhayak Nidhi, allotment of food grains to Kotedars, etc.)

Services like land records, arms license application status, GPF accounts of basic education teachers are available online now. To ensure transparency, details of developmental works, ration allotment to fair price shop dealers, money sent to Gaon Sabhas etc. are made available to people. The most popular service till date has been Online Public Grievance Redressal. The Lokvani system not only gives citizens an avenue to track the progress on their grievance, but also provides the DM an effective tool to monitor the performance of various departments.

4.6.7 The Lokvani business model

To ensure the financial viability and long-term sustainability, the project was implemented through the public-private partnership model. A society by the name of Lokvani was constituted and registered at the district level to function autonomously without bureaucratic hassles. This society, instead of opening new kiosks, decided to use the existing cyber cafes/computer training institutes and identified a set of dynamic young entrepreneurs (with whom the district administration had interacted during an earlier project - computerization of land records) to spearhead the Lokvani initiative. An entrepreneur was required to take a license for becoming a "Lokvani Kendra" by paying Rs 500 (now revised to Rs 1,000) as registration fee. These licenses were to be renewed annually by paying Rs 1,000.

The Lokvani society meets its recurring costs from the payments received from the registration of kiosks, lifetime and annual Lokvani membership fees and other grants. The hardware and software support was provided by NIC free of cost. Revenue for the Lokvani Kendras comes from the users for accessing the Lokvani services (see table 25 for the rate list).

Table 25: Rate list for Lokvani services

S.No.	Activity	Fees
1	Registering a complaint	Rs 10.00
2	Viewing any information on the computer	Rs 5.00
3	Printing of any complaint/ information (per page)	Rs 5.00

Lokvani insisted that entrepreneurs finance their ventures themselves and the contract signed between Lokvani and the licensee explicitly stated that there would be no financial support to licensees. This was done to give the kiosk-owners and citizens a sense of stake in the initiative. The basic belief behind this business model was that the kiosk-owners would be self-motivated to generate revenue, and therefore promote the services of Lokvani.

Neither the Government (DM's office) nor the Lokvani society was required to take up marketing of the initiative. All they had to do was ensure that news about Lokvani was there in all the local newspapers. The media and the Lokvani Centre owners acted as a significant pressure group on the officers to ensure an efficient redressal mechanism.

4.6.8 Sustainability

- As the project is based on PPP, it is expected to be a profit-driven business model and is more likely to sustain because kiosk owners and citizens would work as a pressure group
- A lot of information and many services are provided on Lokvani to make it more viable
- State-wide replication by Government Order making it a part of governance resulting in a permanent change in the service delivery mechanism
- Negligible operational costs

4.6.9 Lokvani: A success

The project was a great success despite the challenges it faced in the form of:

- More than 80 per cent of the population is rural
- Less than 38 per cent literacy in the district
- Only 6 to 7 hours of power supply in the semi-urban areas
- Poor Internet connectivity
- Negative mindset of Government functionaries towards any change in the system
- Almost negligible computer literacy in the district

Innovative features of the model include:

- No loan /Government subsidies was taken for setting up kiosks. This has never been tried before in the country
- Use of existing infrastructure/portal instead of creating new one
- Innovative PPP business model was tried for the first time in rural India
- Internet-based, kiosk-supported approach of service delivery having two-way communication between citizens and Government (through web) tried out for the first time.
- Locally designed simple software in Hindi developed incrementally as per people's requirements.
- Profitability and competition among kiosks used to overcome the infrastructure problem created by poor power situation (only 5-6 hours of availability per day), poor connectivity, illiteracy and backwardness
- IVRS (Interactive Voice Response System) based on Hindi TTS (text to speech) used for the first time in the country
- Intensive citizen engagement

4.6.10 Phased Implementation

A deadline for November 15, 2004 was set for the test launch of the site. Pilot testing the site with their public grievances/complaint services started on November 8, and was fully operational by December 10, 2004. Initially, 13 Lokvani centres (with two in each tehsil except Mishrikh which had three kiosks) were set up. In the first 20 days, the number of complaints received per day

was less than 10. By the first month, the number increased to between 10 and 100. By the end of three months, the number of complaints crossed the 100 mark. As on July 15, 2005 Lokvani had received 28,008 complaints, of which 24,089 had been attended to, or "resolved". The unresolved complaints included 171 complaints that were beyond their due dates, 3,255 complaints within their due dates, and 493 complaints that were yet to be marked to a specific office.

Since then, the contents and services on Lokvani have grown gradually and so has the number of kiosks. The number of kiosks increased to 26 by March, 2005 and as of February, 2006 the total number of kiosks in the district is 42.

4.6.11 Achievements

- First successful G2C project in UP
- Recently Lokvani received Golden Icon Award from Government of India under the service delivery category
- It was one of the few best practices of the country, which were presented before the Cabinet Secretary, GOI in Vigyan Bhavan, Delhi.
- Demonstrated before IAS trainees at Lal Bahadur Shastri National Academy of Administration (LBSNA), Mussorie
- Lokvani has been widely quoted and discusses in leading national magazines and newspapers like India Today, Outlook, The Times of India, etc.
- Lokayukta, UP also praised Lokvani for its services to citizens of Sitapur
- UP Government has issued a Government order to replicate it throughout the State
- The President of Lokvani has won the Dataquest e-Governance Champion award in New Delhi recently.

4.6.12 The challenges ahead

The success and popularity of Lokvani can be gauged by the quick adoption of the model by other districts in UP. The challenges for the Lokvani are, however, considerable.

1. This model of Lokvani has worked quite effectively up to the tehsil, block, and town level. To spread the Lokvani network to the village level, some initial investment in hardware (computers, power support - UPS or solar panels and Internet connectivity) is required, and the Government would be expected to share at least some part of it. Also, at the village level entrepreneurs would be difficult to locate.
2. Another critical factor in ensuring sustainability of the Lokvani initiative would be to add sufficient information and services in Lokvani and make the kiosks viable. Additionally, kiosks could also generate revenue by providing services like computer education, typing, digital photography, etc. The lack of these services could be the binding constraint for scaling up this project
3. Lokvani would need to graduate from first generation e-Governance (creating a system of receiving, monitoring, and responding) to second generation e-Governance (a system that ensures efficiency along with effectiveness - ensuring satisfaction of the customer). Thus, the emphasis would be on the "quality of response" from the citizens. Appropriate measures (like an index of customer satisfaction) need to be developed to ensure the quality of resolution.

Lokvani has laid a firm foundation for the e-Governance in Uttar Pradesh and if the project proves to be a profitable venture, it could be a torchbearer for other such G2C efforts across the country.

4.6.13 Analytic Synopsis

Approach	Indicators
Sen's Approach	**Increase in productivity -** This is achieved as the project has been implemented autonomously with the aim of reducing bureaucratic pressure. The functioning of the Collectorate has been streamlined by reducing the response time and improving the efficiency and productivity of manpower in handling public grievances through the Internet and increasing their accountability before the people. The Lokvani society has helped the Government avoid procedural delays by providing online forms for various applications. The fast disposal of public grievances has been made possible by attending to their complaints online. Lokvani provides a tool to monitor performance of staff. Since the complaints are now traceable, and the action taken available on the web site, corruption is reduced and Government has become more transparent and accountable to citizens. **Extent of coverage -** A major reason for the success of the project has been the 'ease-of-use' to the citizen, especially the illiterate villagers staying in remote areas and senior citizens with the use of text-to-speech software. Citizens do not need to travel long distances to the District Collectorate. They can simply visit the nearest Lokvani centre to access any information they need. The Lokvani centre enters the complaint on behalf of the complainant, thus obviating the need for the user to be literate. A chain of 42 Lokvani kiosks spread throughout the district has been established by licensing existing cyber cafes Lokvani system has empowered the citizens by generating awareness towards their rights through a seamless flow of information. It is an outstanding manifestation of the Right to Information **Female participation -** A noteworthy fact is that 10 per cent of complainants are women from rural interiors, despite the female literacy rate being as low as 12.74 per cent
Brown's Approach	**Increase in income-** Young people have been trained to look after the centres making them confident and self-reliant, promoting entrepreneurship and helping society move away from traditional forms of business. Thus, the initiative has created job opportunities. **Improvement in delivery mechanism-** Better dissemination of Government information has created awareness among rural masses about various Government schemes, thereby saving time and cost of people who visit district headquarters time and again for getting information.
Sustainability/ Scalability/ Profitability	**Sustainability-** Though care has been taken to ensure the long-term financial viability of the project through the conversion of existing cyber cafes/ computer training institutes into Lokvani centres and raising short-term and life membership fees to meet recurring expenses, it would be premature to call the venture a financial success. In addition, infrastructure, power, and telecommunications are some of the barriers against which the viability of the project remains to be tested. The failed experience of the Akshaya project in Kerala, which was also a franchise-based business model with very low user charges, urges us to adopt a 'wait and watch' policy for 3-4 years. **Scalability -** Again, the issue of scalability hinges on whether the model turns out to be self-sustainable and financially viable **Profitable-** It would be prudent to wait to comment upon the profitability of the Lokvani model and to escape the experience of the Akshaya project, where the entrepreneurs felt demoralised and discontinued the Infokiosks

Case Study 7:

Tamilnilam

The Land Records Computerisation Project of Tamil Nadu

TAMILNILAM - Land Record computerisation project has been implemented with 100 per cent financial assistance from the Government of India under Centrally Sponsored Scheme. There are charges levied for serviced availed by the public; the project has proved to be self sustaining.

4.7.1 Background

The Tamilnilam (Tamil Nadu Infosystem for Land Administration and Management) project is a milestone in the history of three departments: Revenue, Land Administration and Survey and Land Records. Nilam means 'land'. The project, which was introduced with the objective of computerising land records data for the benefit of the public, has brought about a sea change in the land records system of Tamil Nadu. The project has led to enormous benefits for the public. Patta copies are available across the counter in 201 of the 206 Talukas for a nominal fee of Rs 20. For a fee of Rs 2, all landowners can view the data relating to their land.

4.7.2 Objective of the Project

The objective of the Tamilnilam project is to ensure that land record data is fully computerised so that it can be used both for issue of copies of record of rights as well as for various other purposes, which are summarised as follows:

- Delivery of all possible citizen-centric e-Services
- Issue of Chitta extract (Record of Right) / A Register extract / Adangal extract to citizens
- Tamper proofing land data to reduce land disputes
- Creation of master data base for storing plot wise and owner wise details of land, crop, revenue, etc.
- Generation of periodic reports on land records through the computerised system
- Improved and efficient service
- Easy maintenance and update of land records
- Transparency in administration
- Availability of information to public through Touch-Screen kiosks
- Exchange of data with other departments such as the Sub-Registrar's Office, Agriculture Department, etc.

In short, the main objectives of the scheme are:

- Taking the administration closer to the public by making data easily accessible to public
- Quicker delivery of extracts of documents to land owners and others

4.7.3 Services offered by Tamilnilam

The transactions handled by the Tamilnilam software are:

1. Full field Patta transfer
2. Joint Patta transfer
3. Sub-division of land
4. Merging of sub-divisions of land
5. Change of Classification of land
6. Adangal (limits of the land)
7. Assignment
8. Alienation
9. Land acquisition
10. Encroachment on the land
11. Land revenue
12. Settlement

Apart from issue of land records extract, computerised services include:

1. Grievances monitoring system
2. CM cell petitions monitoring system
3. Issue of different certificates such as land ownership, birth and death certificates etc.
4. Old age pension
5. Disbursement system
6. Payroll

4.7.4 Business Model

The Tamilnilam project is being implemented in the State with 100 per cent financial assistance from the Government of India under a Centrally-sponsored scheme. The land owners can view the data relating to their land for a nominal fee of Rs 2 and the Patta copies are available across the counter in 201 of the 206 Talukas in Tamil Nadu for a fee of Rs 20. On an average, more than Rs 25 lakh has been collected as User Charges through the services provided every month. The project had generated revenue of Rs 90 lakh within 18 months of its implementation. So far, 60.36 lakh computerised land records extracts have been issued to the public. In all, Rs 12.24 crore has been collected as User Charges.

4.7.5 Implementation Status

Tamilnilam started out in April 2002. It was first implemented in 29 Talukas as a pilot project and later on replicated in the remaining 173. Currently, the software has been implemented in all the rural Talukas of Tamil Nadu. To increase the Government - public interface, Touch Screen Computer Kiosks (TSCK) have been installed in 127 Talukas and the remaining 79 Talukas would be covered in the near future. On an average, more than 1.25 lakh citizens are availing the services like Chitta / Register extract using Tamilnilam each month.

4.7.6 Software Features of the System

The software used for Tamilnilam is in the local language, thus making it user friendly. It also provides for role-based privileges, user logs and history tables, printing of Chitta extracts for public, printing of public transfer orders, sub-division order printing and maintenance details of crops. Ad hoc query facility is also available.

4.7.7 Hardware Infrastructure at Talukas

Each Taluka has been equipped with one Server, three clients, one dot matrix printer, a laser printer, and a UPS. Some of the Talukas, as with the one in Perambalur district, have additional clients under specific projects. Touch - screen kiosks are available in 127 Talukas.

4.7.8 Training

For operating the Tamilnilam software, key resource persons were identified and trained at talukas. About 8,000 revenue officials were given overview training on computers and Tamilnilam software usage. NIC (National Informatics Centre) TNSC (Tamil Nadu State Centre), Chennai conducted workshops for DROs. Five days' training programmes were also conducted for selected Tehsildars. NIC District Informatics Officers are conducting training on need basis to Taluka officers on Tamilnilam.

4.7.9 Business Process Reengineering

- The Government of Tamil Nadu has discontinued with issuing manual extracts of land records and only computerised land records are being issued to the public
- The Commissioner of Survey and Settlement has issued an Order stating that the transaction details of every land transfer should be first entered in the Taluka computer
- The Order mentions that the Order for Transfer of Land should be generated from the system computers and the tehsildar must sign only such system generated orders
- The Government has issued instructions that as soon as Form 6 is received from the registration department along with the signatures of the seller and buyer authenticated by the Sub-Registrar, the Patta transfer process can be initiated immediately by the Taluka office
- Adequate training for all Revenue staff has been provided to handle the system, besides key resource persons at each Taluka

Taluka Office-Sub Registrar Office Connectivity

The Government has decided to interconnect the taluka offices with the sub-Registrars' (SR) offices. The main objective is to reduce the time delays involved in transferring the changes from one office to other. In the first phase, Taluka and SR offices, which are on the same campus, have been interconnected. The SR's office can view the land details for any survey number and sub-division number before registration. The Taluka office can also view the details of registration and initiate Patta transfer process.

Intranet-based monitoring system

NIC TNSC has developed Intranet based systems for the purpose of monitoring by the Office of Special

Commissioner of Survey and Settlement the following activities:

- Kiosk Collection
- Tamilnilam Implementation
- Adangal Data Entry Progress

4.7.10 Achievements

- The initiative was an award winning project and the team leader, Shri T.K.Ramachandran, received an award from the Deputy Prime Minister, Shri L.K. Advani, during the 7th National e-Governance conference held on November 14, 2003 at Chennai
- The project also received the Skoch Award in February 2005

4.7.11 Conclusion

This new initiative has introduced transparency and is citizen friendly. It has reduced red tape and has cut out middlemen by throwing open direct access to the public. In the process, the project has proved to be self-sustaining, generating revenue of approximately Rs 90 lakh within 18 months of its inception. Public reception to the project has been very encouraging and has reinforced faith in the concept that if the service interface is 'good' – meaning transparent, prompt and corruption-free – and if it delivers value for money, the public is willing to pay.

4.7.12 Analytic Synopsis

Approach	Indicators
Sen's Approach	**Increase in productivity -** This is achieved as the project has led to quicker delivery of land extracts documents to land owners and others. Tamilnilam has helped the Government in avoiding procedural delays in providing land-related extracts through online availability of information at the kiosks. Fast disposal of public grievances has been made possible by attending to their complaints online.. **Extent of coverage -** A major reason for the success of the project has been the 'ease-of-use' to the citizen, with the use of touch screen kiosks as well as availability of content in local language. The touch- screen kiosks have been set up in 127 out of 201 Talukas where the project has been implemented.
Brown's Approach	**Improvement in delivery mechanism-** Tamilnilam has cut down red tape and has reduced middlemen in the process by providing direct access to information and services to the public.
Sustainability/ Scalability/ Profitability	The project has been implemented in the State with 100 per cent financial assistance from the Government of India under centrally sponsored schemes. It has proved to be self-sustaining, generating revenue of Rs 90 lakh within a year and half. There is a user charge for most of the services offered thus, making it self sustainable.

Case Study 8:

e-Kosh- Computerisation of the Treasury Department

An Initiative of the Chattisgarh Government

e-kosh- the computerisation of Treasury department of the state of Chattisgarh has not only improved the internal efficiency but also has brought about transparency in the procedures of the department.

4.8.1 Background

The Treasury is the focal point of the initial financial transactions of the Government. For efficiency and transparency in financial management, any Government depends primarily on timely preparation of accurate accounts. In the pre-computerisation era, when accounts were prepared manually, delay in preparation of monthly treasury accounts was a regular feature. Moreover, it was difficult to verify their accuracy. As numerous discrepancies crept into treasury accounts each month, it became extremely difficult to tally the treasuries' figures with those of banks. This resulted in the delay in preparation and submission of error-free treasury accounts. To overcome these difficulties, the Chattisgarh Government sought the computerisation of the treasury department.

The challenges faced by the Treasury Department before computerisation were:

- Unmanaged financial accounting system
- Control was not possible on overdraws at the field level due to the lack of an efficient budget control mechanism
- Non-availability of information on expenditure/ receipts on a day-to-day basis as submission of sub-treasury level information took place once/twice a month.
- Submission of misclassified expenditures/receipts created trouble during the reconciliation of accounts
- Delay in processing of pension cases at divisional joint directors' offices
- No control over pending bills at a higher level
- No transparency in payment procedures, thus making the system completely dependent on the discretion of the Treasury Officer/Staff.

In 1998-99, Foxplus software was developed for the department by the NIC-MPSC department. However, the software was only serving the purpose of compilation of reports that were required to be sent to the Government, local maintenance and to the Auditor-General (AG)'s office. The account details were unclassified and it was not possible to check budgets before passing the bills. The other anomalies associated with Foxplus software were:

- No control on the over drawls of bills by Drawing and Disbursing Officers (DDOs)
- Classified reporting system was not possible.
- Data from sub-treasuries was taken to district treasuries only twice or thrice each month resulting in information gaps at higher levels of the department on day-to-day payments /receipts position at various locations
- Settling of pension cases took a long time (no software available for this earlier) thus affecting the financial status of pensioners

4.8.2 New initiative

To overcome the above discrepancies, particularly to ensure that bills were passed in consonance with the sanctioned budget allotments, and, to assess the financial position of the State at a given point of time, the Department decided to avail advanced technologies and therefore approached NIC for providing necessary solution. The project was taken up on a turnkey basis in 2003-04. The Directorate of Treasury Accounts and Pensions launched the project 'e-Kosh' in 2004. The project focusses on online passing of bills at treasuries in consonance with the sanctioned budgets for expenditure and also maintains the classified head of account for each bill. This avoids overdraws by field level DDOs and facilitates submission of updated and classified information on expenditure and receipts to departments

and the Government from the lowest level of the sub-treasury on daily basis.

4.8.3 Key Objectives of the e-Kosh Model

The major objective of the system is to monitor, control and execute financial transactions (payments and receipts) of the State Government and compilation of financial statements/reports for the State Government and AG. The other objectives of the project are:

- To develop a web-enabled, easy-to-use software to automate the entire procedure pertaining to the activities of the Treasury Department
- To provide information on actual receipts/payments on a day- to- day basis to the Finance Department so that the actual finance position can be made available which is vital for planning purposes
- To provide IT-enabled services to the end-user, who may be a pensioner, or a department that submits bills for payment using the state-of-the-art technology
- To provide complete transparency of the treasury procedures to the consumer base so that the consumer can get the benefits of real governance

4.8.4 Implementation Strategies

The Department of Treasury, Government of Chattisgarh, approached NIC Chattisgarh, for providing software solution to effectively monitor the activities of district treasuries and sub-treasuries and the State Department of Treasury. Accordingly, an NIC team studied the complete workflow of the Treasury and a detailed report was prepared. A new model, *e-Kosh*, has been designed to bring online the activities of the Department of Treasury in the State to improve its functioning, provide important information at the State level on a day-to-day basis and achieve transparency among departments, public and department of treasury and to present web interface to the end-users for faster dissemination of information with reference to their cases. The software modules already available with the units of Punjab and Haryana were studied for implementation in Chattisgarh. It was felt that the procedure with respect to the payments was comparable with that of Punjab and hence the software developed by the NIC Punjab State Unit was obtained. Necessary customisation was done as per the requirements of the State Treasury Department.

NIC, Chattisgarh State, designed, developed and implemented a suitable model to automate the functioning of the treasury system with respect to its major sub-systems of Payments, Work Accounting, Deposit Accounts, Receipts, Pensions and Stamp Accounting. The total project cost was Rs. 11.54 crore spread over three years.

The key stakeholders of the project are Director FMIS (Financial Management Information System), Director (Treasuries Accounts and Pensions), other executive and field-level staff of treasuries, AG office, NICSI (National Informatics Centre Services Inc.), SATCOM (Satellite Communication) group of NIC and NIC team from Chattisgarh State Centre.

4.8.5 Phased Implementation

The project rollout took place in three phases of implementation.

Trial Implementation: The project was implemented on trial basis in the city treasury of Raipur, Chattisgarh from August 2004 to October 2004. All the practical procedures were tested and refinements were made in the software with respect to payments and receipts excluding the requirement of data merging and pension payments at treasuries.

Pilot Implementation: The project was then taken for implementation in two districts of Raipur and Korba, covering their respective eight sub-treasuries in November 2004. All aspects, including budget control through the central server, pension payments at treasuries, merging of sub-treasury data into the data of the district treasuries on a daily basis, were successfully tested in this phase.

Final Rollout: After a successful pilot phase, the project was rolled out for implementation in all the remaining 14 districts and 38 sub-treasuries in April 2005.

4.8.6 Technology

- DVB VSATs capable of providing up to 384 kbps connectivity is being used to check the field-level data with data available at the central server for every transaction in the payments sub-system
- Java-based web module hosted on Oracle Application Server is used to capture the information on budget

allotment from various locations across the State. Budget Controlling Officers input the data of budget allotment to district level DDOs at the central server. DDOs at the district level further input the allotment information to their sub-DDOs if any

- For checking payments under each head, the locking and unlocking mechanism provided in SQL Plus has been used for effectively updating the information at treasuries and the central server in a distributed database environment.

4.8.7 Benefits accrued from this project

1. Online communication of budget allotments to DDOs from Budget Controlling Officers
2. Misclassification of heads is checked through software
3. Online bill passing in consonance with sanctioned budgets in case of budgeted bills
4. Non-budgeted bill passing is checked through software
5. Daily merging of sub-treasury data with district treasury data for preparation of accounts with respect to payments, receipts, pension payments, issue of cheques, payment status of cheques
6. Online updating of payment status from every treasury/sub-treasury at the central server
7. Processing of pension cases streamlined at JD offices
8. With the help of information on scheme-wise expenditures, the departments are able to monitor the budget requirements.
9. Internal efficiency is improved, eliminating manual maintenance of records
10. Implementation of Payments sub-system has ensured that all the manual procedures are translated in a systematic and classified manner
11. Implementation of Receipts Sub-System with establishment of proper linkage between Payments and Receipts modules
12. Integration of Deposit Accounts with payments and receipts sub-systems provide the required information
13. Integration of Pension payments at treasuries and works accounts to provide complete accounting information needs of the treasuries
14. Accepting data in soft copy from banks for receipts on a daily basis
15. Provides online information to departments and DDOs on expenditure and receipts as required

Improvements over the earlier system

1. Internal efficiency of treasury staff, thereby treasuries improved to a great extent
2. Transparency with respect to payment procedures is maintained till the highest level
3. Pending bills are monitored at the levels of Treasury Officer, Joint Director and Director (Treasuries) to ensure the early clearance of bills
4. Bill passing is under complete control from any treasury/sub-treasury
5. Time taken in bill processing is reduced to 1 or 2 days while it was 7 to 8 days earlier
6. Payments made from any treasury are recorded instantly at central server
7. Possible over drawl of funds by DDOs is completely avoided
8. Misclassification of heads pertaining to a bill is checked through software
9. While sub-treasuries' accounts were taken in district treasuries once/twice
10. Before implementation of the software, the data now is being merged on regular basis avoiding delay in submission of accounts to AG Office.
11. Matching of accounts at treasuries is now done with ease and accuracy as per classified heads
12. Status of bill(s) pertaining to any treasury/sub-treasury is available at the central server
13. Receipt of pension cases, processing and discharging of orders, viz. Pension Payment Order, Gratuity Payment Order, Commutation Payment Orders, etc. are streamlined at Joint Director Offices, thereby improving the speed and efficiency in disposing the cases.
14. e-Kosh online web interface has been provided to make the information available to departments, their heads and the public at large

4.8.8 Current Status

- Around 4,000-5,000 bills are entered and processed every day from all the treasuries across the State
- Around 3,000-4,000 cheques are prepared and issued to DDOs every day from treasuries on peak days
- 6,000 challans for receipts are captured from the treasuries including sub Treasuries every day
- Pension disposal time reduced from 3 months to 10 days
- Bill processing time reduced from 7 days to a maximum of 2 days

4.8.9 Future Plans

- Some of the points to be considered for further improvement in the working of the treasury department are:
- User authentication through biometric devices to achieve more secured access
- Electronic submission of monthly accounts to AG's Office
- Acceptance of receipts through e-Challan is to be worked out with Banks
- Data sharing with banks on payment of cheques to reduce the data entry related to discharging of cheques at treasuries
- To consolidate payroll related bills at DDO level for each employee-using employee database and submit a single bill electronically to treasuries. In turn, the treasury would be able to capture the bill information with respect to each employee in soft copy, which is required by the AG's office for employee level consolidation. The elimination of data entry of pay bills is expected to be reduced by 60 per cent at treasuries
- Electronic bill submission from DDOs using digital signatures is under consideration

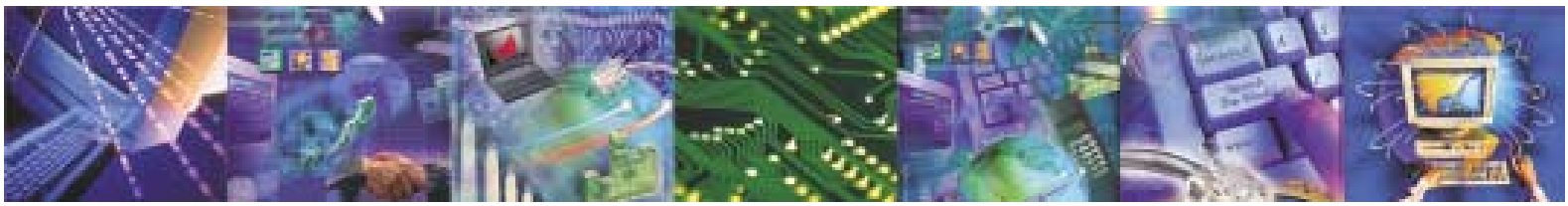
4.8.10 Conclusion

The computerisation of the Treasury Department of Chattisgarh has improved the internal efficiency as well as has brought transparency in the procedures of the department. People may view information on expenditure incurred by any department on any scheme. District and head-wise receipt information can also be viewed for any purpose by all. The system has considerably reduced the total bill processing time.

4.8.11 Analytic Synopsis

Approach	Indicators
Sen's Approach	**Increase in productivity -** This is achieved as the total time taken in processing bills is reduced from 7-8 days to 1 or 2 days. Pending bills are monitored at the levels of the Treasury Officer, Joint Director, Director (Treasuries) to ensure the early clearance of bills at treasuries. The pension disposal time has also been reduced from three months to 10 days. **Extent of coverage** - The e-Kosh Treasury system has been made fully operational State-wide across all districts and sub-treasuries in Chattisgarh with online budget checking and centralised database at Raipur and Bilaspur. VSAT-based network has been established up to the block levels. Web based software has been implemented for effective monitoring of rural schemes. The e-Kosh online web interface has been provided to make the information available to departments, HoDs as well as public.
Brown's Approach	**Improvement in delivery mechanism-** Internal efficiency of the treasuries has improved to a great extent. Receipt of pension cases, processing and discharging of orders, viz. Pension Payment Order, Gratuity Payment Order, Commutation Payment Orders etc. are streamlined at Joint Director offices improving the speed and efficiency in disposing the cases
Sustainability/ Scalability/ Profitability	The project was initiated by the Department of Treasury, Government of Chattisgarh, and the software solution was provided by NIC. The introduction of the software has introduced a budget control mechanism (control over drawls at field level)

Diffusion of ICT and Output and Employment Multipliers in Key Indian States



CHAPTER FIVE

Diffusion of ICT and Output and Employment Multipliers in Key Indian States

Today there is an increasing demand for compression of time and space in each and every field of daily life. The first name that comes into the mind is ICT, which mostly satisfies this demand. According to the Global Information Technology Report (GITR) 2004-05 brought out by INSEAD and World Economic Forum, India became the 39th country in the Network Readiness Index (NRI). In the post-1991 period a slew of reforms has given an impetus to the Indian economy, and particularly to ICT because as part of the reform agenda, the Indian Government has taken major steps to promote ICT. Among the measures undertaken is the creation of a World Market Policy in 1988, with a focus on software development for export, telecommunications policy reform, privatisation of the national long-distance and mobile phone markets and development of a more comprehensive approach to ICT.

Intense debate is in progress – both in the developed and developing worlds - on the contribution of ICT towards productivity and growth on the one hand and human welfare on the other. By juxtaposing the slowdown in the productivity growth in the US since the late 1960s against the dramatic increase in IT spending over the same period, studies have come up with the "productivity paradox", arguing that IT has not resulted in expected productivity improvements. However, evidence from recent cross-country studies indicates that returns to investment in IT, in terms of productivity and growth, can be substantial (Pohjola 2001; Kraemer and Dedrick 2001). Pohjola finds the output elasticity of IT capital to be as high as 0.31 for a sample of 39 countries and 0.23 in an OECD sub-sample. Another cross-country study by IMF (2001) also had similar conclusions to offer. Country specific studies like the one for Singapore (Wong 2001) found that the net returns to IT capital (37.9 per cent) is about two-and-half times higher than that for non-IT capital (14.6 per cent). These studies also show that IT-induced productivity and growth still remains a phenomenon observed in developed (OECD) countries and that developing countries are yet to catch up.

This takes us to the other dimension of the ongoing debate-the international digital divide. Given the present unequal access to ICT, it has been argued that new technology reinforces disparities between post- industrial societies at the core of the network and developing countries in the periphery. Multilateral organisations like OECD and UNDP share the same view. OECD (2000) reports that affluent States at the cutting edge of technological change have reinforced their lead in the new knowledge economy. However, benefits have not trickled down to southern, central and eastern Europe, let alone to the poorest areas in sub-Saharan Africa, Latin America or South East Asia. In a similar vein, UNDP (1999) argues that productivity gains from IT may widen the gulf between the most affluent nations and those lacking the skills, resources and infrastructure to invest in IT. However, there are a few studies to indicate that the Governmental initiatives in the area of ICT (supply side response) had the desired impact on economic development in developing countries (next section).

Analytically, the contribution of ICT can be viewed at two different but interrelated levels-ICT growth and ICT diffusion. The former refers to the contribution to output, employment, export earning, etc. resulting from the production of ICT- related goods and services. This is limited to just one segment of the economy (Kraemer

and Dedrick 2001). The latter refers to IT-induced development through enhanced productivity, competitiveness, growth and human welfare resulting from the use of this technology in different sectors of the economy and society. Many of the studies in these areas are anecdotal citings and are not based on analysis of hard data and, thus, need to be taken with a pinch of salt.

India has attempted to profit from ICT growth through a series of institutional innovations and export oriented policy measures, based on the implicit assumption that a market-oriented ICT growth strategy will also result in the diffusion of new technology and ICT-induced development.

5.1 Use of ICT and Economic Development

The role ICT is popularly considered as very critical for economic development. But there has to be greater domestic use of it as an engine of economic growth. In contrast to the experience of the advanced industrialised countries, the developing countries find ICT available to them at a much earlier stage of their development. These economies are not very well optimised and the use of ICT has the potential to help them transition from subsistence to an exchange economy relatively rapidly. But for this to happen, ICT must be targetted for domestic use, and not just seen as an avenue for foreign exchange earnings.

Notwithstanding the current unequal access to IT, it has been argued that in the current era of globalisation the ability to harness technology improves the capability of firms in developing countries to withstand competition from MNCs or to develop partnerships with them. At the same time, IT poses a potential threat. If developing countries are unable to harness this new source of wealth (Pohjola, 1998), it would exacerbate their backwardness. Moreover, developing economies are expected to gain substantially (Mohnen, 2001) through ICT spillovers. Drawing on the new growth theories, it may be argued that ICT could be instrumental in breaking the vicious circle of Idea Gap and Object Gap (Romer, 1993)-the root cause of persistent poverty and underdevelopment. No wonder developing countries have shown great interest and pegged high hopes on Information Technology as the shortcut to prosperity (UNDP 1999; World Bank 1999).

Norris, in her analysis of the correlation between levels of diffusion of old media (television, radios, telephones, newspapers) and new media (PCs, Internet, etc.) across different countries, found a highly positive and statistically significant relationship (see Table 26). Based on this finding, it was concluded that there was little distinction between old and new media, and the proportion of online users in a country was not only strongly related to the distribution of hosts, telephones and PCs, but also to the distribution of radios, TV sets and newspaper readership in each country. These studies, therefore, suggest that 'to them that hath, shall be given'. In reaching such pessimistic conclusions, the studies cited above seem to have failed to recognise certain unique characteristics of the new technology, which do make the leap-frogging quite feasible as long as appropriate policies are in place. To begin with, unlike earlier technologies, investment in new technology essentially complements investments already made in communications technologies, like satellites, telephone networks and cable TV networks. Thus there can be substantial returns with marginal investments. Second, newly developed technologies make it possible to connect remote villages and thus greatly reduce the cost of last mile connectivity (Planning Commission, 2001). Finally, new technologies are multi-user by nature, which, in turn, leaves scope for Internet kiosks, Internet cafes and Community Internet Centres (CICs), providing access to many.

There are also certain empirical problems in the studies presented above. The Correlation Analysis outlined above, which uses cross-section data for different countries, essentially presents a static analysis, whereas the diffusion of technology is a dynamic process. Moreover, the technologies considered in the analysis vary in terms of their age. For example in the US, the Internet is a post-1994 phenomenon, whereas television was introduced more than 50 years ago. Therefore, the present level of TV diffusion (844 sets per 1,000 inhabitants) has been achieved over a period of more than five decades, while the current level of Internet diffusion (266 per 1,000 inhabitants) has been reached in just over eight years. Therefore, simple correlation analysis can be misleading. Studies show that the diffusion of any technology is conditioned not only by the characteristics and strategies adopted by diffusion agents (Brown, 1981), but also by factors specific to technology. Thus, the rate of IT diffusion is governed by diffusion agents such as Internet service providers, Government and NGOs and other stakeholders. An attempt is made to present a preliminary analysis by looking at the rate of diffusion rather than the level of diffusion.

Table 26: Correlations in the Use of the New and Old Media

	Online	Hosts	PCs	Radio	TVs	Newspapers	Phones	Mobile Phones
Hosts	0.854							
PCs	0.806	0.745						
Radio	0.788	0.708	0.818					
TVs	0.692	0.614	0.769	0.848				
Newspapers	0.725	0.715	0.788	0.749	0.734			
Phones	0.791	0.710	0.886	0.837	0.861	0.839		
Mobile phones	0.809	0.827	0.85	0.754	0.715	0.830	0.872	

It is evident from Tables 27, 28 and 29, that the value of the Correlation Coefficient based on the rate of diffusion is much lower than the Correlation Coefficient between the levels of diffusion. More importantly, the value of the Correlation Coefficient declined substantially in the case of the developing countries. What does this finding

Table 27: Correlation Coefficient between the Rate of Diffusion of Different Technologies

	Television	Radio	Internet	PCs
Television	1			
Radio	0.694	1		
Internet	0.561	0.618	1	
PCs	0.568	0.639	0.913	1

Table 28: Correlation Coefficient between the Rate of Diffusion of Different Technologies in Developed Countries

	Television	Radio	Internet	PCs
Television	1			
Radio	0.787	1		
Internet	0.689	0.698	1	
PCs	0.711	0.763	0.872	1

Table 29: Correlation Coefficient between the Rate of Diffusion of Different Technologies for Developing Countries

	Television	Radio	Internet	PCs
Television	1			
Radio	0.577	1		
Internet	0.372	0.340	1	
PCs	0.319	0.418	0.0672	1

signify? Some tentative inferences may be in order. Unlike old technologies, which are more demand-driven, the new technology is supply-driven and leaves greater scope for the diffusion agents (Government, NGOs, the private sector and other actors) to influence the diffusion process. Even with low connectivity, innovations like kiosks, cafes and community centres focussing on Internet can greatly offset the limits imposed by lower connectivity and poor information infrastructure.

In the case of India, lately there has been a number of initiatives by the Central and State Governments, along with NGOs and the private sector, to help the diffusion of ICT in different economic sectors. Such initiatives are unprecedented, not only in terms of scale but also with regard to new organisational innovations. While most are in their initial stage, available evidence suggests that ICT could effectively be used to transform rural regions even in a developing country like India. Until

Table 30: Indicators of IT Use in India's Industrial Sector (1997)

Industries (2 digit level)	Total no. of factories	Per cent of factories with			
		Computers in the office	Network	Internet	Robots or Computers in production
Food products	14,695	13.01	0.84	1.39	0.29
Other food products	8,109	24.17	1.38	2.01	1.64
Beverages tobacco, etc.	8,669	47.81	0.36	0.28	0.14
Cotton textiles	9,227	22.28	0.54	1.87	1.37
Wol/silk manufacture of textiles	3,989	49.76	1.25	2.28	0.25
Jute & other vegetable fibre textiles	503	16.70	0.40	3.78	0.60
Textiles prod., ind. apparel	5,409	51.32	3.18	11.31	2.09
Wood and wood products	3,787	8.98	0.40	0.95	0.24
Paper and paper products	6,304	38.50	1.84	3.73	4.71
Leather products	1,742	37.60	1.89	7.18	0.29
Basic chemicals and related products	9,357	50.69	2.91	5.58	2.56
Rubber plastic and coal	7,597	42.57	2.80	4.01	1.59
Non-met. mineral products	11,376	13.37	0.41	0.95	1.09
Basic metal and alloys	6,915	41.94	0.93	3.69	1.72
Metal products	8,243	31.68	0.92	2.86	1.01
Mechinery and equipment	8,203	44.46	2.12	5.63	2.66
Transport esuipment	5,743	55.77	3.53	10.92	4.89
Scientific equipment3,999	46.96	1.63	7.15	2.58	
Repair of capital goods	2,240	25.89	0.80	1.96	0.36
Electricity	3,644	64.71	0.93	3.10	3.24
Gas and steam	80	75.00	2.50	3.75	5.00
Water works and supply	293	10.58	0.68	1.02	0.68
Non conventional energy	4	25.00	25.00	25.00	0.00
Storage and warehousing	1,0778	0.37	0.37	0.09	0.00
Sanitation	102	0.00	0.00	0.00	0.00
Motion pictures. etc	51	7.84	7.84	27.45	0.00
Laundary and others	94	0.00	0.00	0.00	0.00
Repair services	1,966	2.59	2.59	1.12	0.00
All industris	135,679	34.70	1.50	3.72	1.77

Source : Central Statistical Organization (*Annual Survey of Industries)* 1997

today, there has been no specific policy in India's industrial sector to address the issue of IT diffusion. Nonetheless, available evidence suggests that a significant beginning has been made. Computers for accounting and management are becoming widespread, with office computers available in more than 34 per cent of the factories (see Table 30). With regard to the Internet, some export-oriented industries (textiles, or knowledge-intensive industries like scientific instruments) are ahead of others. Evidence suggests that Indian firms, in the current era of globalisation, are harnessing new technologies in order to enhance their productivity and competitiveness. Thus, even though ICT for development is a lower priority, it is obvious that the new technology is being diffused into different sectors of the economy. But what are the returns to such investments? How to account for the inter-firm and inter-industry variation in the levels of ICT usage? What are the constraints, and what policy initiatives are called for in order to accelerate the diffusion process? These are some of the issues on which our understanding is rudimentary and further research is required in order to make informed policy decisions.

5.2 The Output and Employment Multipliers

Since Indian States resemble little nations by themselves, we tried replicating the above analysis at the State level. However, due to unavailability of data, we restricted our analysis to the Output and Employment Multipliers only through the use of an Input-Output Table to see how these multipliers vary across key States. We calculated the Output and Employment Multipliers for the country as a whole as well as for the key States to assess how the diffusion of ICT is taking place across the nation. This is a unique contribution of the report.

The significance and potential of any industry can be observed by looking at two important indicators, i.e., the Output Multiplier and the Employment Multiplier. The Output Multiplier can be defined as the total increase in output for every unit increase in final demand of a particular sector. The Employment Multiplier is specified as man-years of additional employment created for a unitary increase in the output of the sector. Both these measures spell out the backward linkages with other sectors of the economy in terms of Output and Employment effects.

To arrive at the Output and Employment Multipliers for the ICT sector, the Input-Output (I-O) Table designed by the Central Statistical Organisation (CSO) is used. The Table is based on nationally representative samples from both the organised and unorganised sectors. The I-O Table divides the Indian economy into 115 sectors. For production sectors like Agriculture, the data is available from the Directorate of Economics and Statistics, Ministry of Agriculture. For Registered Manufacturing, the Annual Survey of Industries is used as the source of data and for Unregistered Manufacturing the estimates are based on NSSO data. Till date, the CSO has not considered Computer Software and Hardware as a separate sector. These have been clubbed with the "Other Services" sector. For this purpose NCAER has constituted a Research Cell under the guidance of an expert who built the first I-O Table for the country and has also evolved the Indicative Output and Employment Multipliers using an appropriate methodology.

The procedure used along with an illustrative example to derive the Output and Employment Multipliers is given in Annex II.

5.3 State-wise Output and Employment Multipliers

The multipliers of the States for the software sector have been derived from the all-India multiplier figures of the software sector given above using the ratios of Employment/Output and Input/Output. Table 31 shows the Output and Employment Multipliers of a few major States of the country.

Table 31: Software sector-Output Multiplier and Employment Multiplier

State	Output Multiplier	Employment Multiplier
Delhi	1.41	2.35
Chandigarh	1.92	1.49
Maharashtra	3.22	0.32
Andhra Pradesh	1.15	3.87
Karnataka	1.45	0.23
Kerala	1.64	2.56
Tamil Nadu	1.46	0.67
Punjab	1.11	2.27
Haryana	1.62	2.00
Rajasthan	1.42	5.40
Uttar Pradesh	1.31	1.43
West Bengal	1.41	2.18
Orissa	1.38	4.34
Madhya Pradesh	1.84	5.45
Gujarat	2.25	1.30

The Output Multiplier for the software sector varies from 1.11 to 3.22 including the unitary impact of the software sector. The Employment Multiplier for the software industry is in the range of 0.23 to 5.45 man-years per lakh of output at 2001-02 prices. In developing States like Orissa, Madhya Pradesh, Rajasthan, etc., the Employment Multiplier is high whereas the Output Multiplier is low, thus indicating the existence of low technical applications and high involvement of skilled labour in ITES. The "horizontal" diffusion level of ICT in these developing States would be far higher than the developed States where the Output Multiplier is high indicating higher "vertical" diffusion and the Employment Multiplier is low. In developed States like Maharashtra, Gujarat, etc., the vertical linkages are higher due to the use of high technical input. Thus, IT plays a unique role in both technically advanced as well as developing States.

Table 32 : Hardware Sector-Output Multiplier and Employment Multiplier

State	Output Multiplier	Employment Multiplier
Delhi	3.17	0.10
Maharashtra	2.71	0.36
Andhra Pradesh	2.16	0.57
Karnataka	2.52	0.09
Kerala	2.67	1.46
Tamil Nadu	2.12	4.10
Haryana	2.84	0.24
Rajasthan	2.77	0.23
Uttar Pradesh	2.19	0.06
West Bengal	2.40	0.39
Gujarat	2.42	0.31

To arrive at the ICT sector's Composite Output and Employment Multipliers, we used a weighted average of the Output Multiplier of the hardware and software sectors in key States. The weights being the ratio of national output of the hardware and the software sectors.

For ICT as a whole, the Output Multiplier is 2.3, viz Rs 2.3 lakh increase in output of the economy for every Rs one lakh increase in output of the sector under consideration including the unitary impact of this sector (See Table 33). Similarly, ICT creates employment of 0.36 man-years for every Rs 1 lakh of output of the sector. For the software sector alone, the Output Multiplier is 2.2 and the Employment Multiplier is 0.38. For the hardware sector, the Output and Employment Multipliers are 2.5 and 0.18 respectively. In other words, increased output of one lakh in the software sector creates an additional employment of 0.38 man years. Similarly, an increase of one lakh of output of the hardware sector creates an employment of 0.18 man years. The sectors that exhibit strong backward-linkages with other sectors of the economy are presumed to have a higher Output Multiplier. Sectors having an Output Multiplier of two or more may be treated as key sectors for economic growth. The software and hardware sectors which have higher than average Output Multiplier (contrary to the popular perception that these sectors don't have strong backward linkages) may be eye-openers for India's policy planners. The increase in software and hardware sector outputs does have a significant Output Multiplier effect and should, therefore, be encouraged.

Table 33: Output Multiplier and Employment Multiplier for ICT Sector

	ICT Sector (Hardware + Software)	Hardware Sector	Software Sector
1. Output Multiplier	2.3	2.5	2.2
2. Employment Multiplier(man-years per Rupees lakh of output)	0.36	0.18	0.38

Thus, we see that ICT can make leap-frogging possible. It does not accentuate differences but encourages economic development. Developed States like Maharashtra, Tamil Nadu, etc. could attract technical talent whereas developing States like Rajasthan and Madhya Pradesh could offer opportunities for employment associated with IT. Thus, ICT has a role to play in both technically advanced as well as developing States.

Action Plan

CHAPTER SIX

Action Plan

E-Readiness Assessments for States/UTs in India were conducted by NCAER for 2003 and 2004. Encouraged by the overwhelming response and positive feedback received on these e-Readiness Assessments, the Department of Information Technology, Government of India initiated e-Readiness Assessment 2005 as well. The States have used these reports to carve out their respective road maps for improving their network readiness as well as increasing the penetration of ICT for economic development. In fact, the States are engaged in policy competition for improving their e-Readiness.

6.1 Unique Features of the e-Readiness Report, 2005

For the first time, Output and Employment Multipliers of the key States of India for the Software, Hardware and ICT Composite segments have been calculated to assess the catalytic effect of ICT on their economic development. The second unique feature of this report is the comparative analysis of the e-Readiness status of Indian States over a three-year period (2003 to 2005). This helps us not only to evaluate but also to monitor State performance. These rankings help us understand whether the States have adopted strategies and action plans to improve their Network Readiness Index. The report also brings out the key factors that States should address to tune up their e-Readiness rankings.

6.2 Indicators of Significance for the States: An Aggregate Analysis

Based on the quantitative analysis, indicators that emerge as important and should be given priority by the States while addressing e-Readiness issues are:

Political and Regulatory Environment

- Proportion of policies taken up for e-Governance.
- Existence of cyber laws in the State.

Infrastructure Environment

- Access to social and educational infrastructure. Factors that are important here include: average distance to the nearest primary school, post office, public telephone booth, computer training centre, college, Internet kiosk, medical store, etc. All these variables turn out to be crucial which is in consensus with our other research finding that old and new technologies are complementary in nature.

Individual Readiness

- Household penetration of computers, telephones and mobiles is a very important variable of Individual Readiness. Training of users in Government-owned computer kiosks has been a significant factor in the North-Eastern region.

Business Readiness

- Setting up of IT parks and increasing the number of IT companies: This proves that competition matters. However, in the case of ISPs and cellulars, limited competition is only possible due to technological constraints such as minimum number of subscribers to be viable per operator, etc. (natural market concentration rider for stable long term operators)
- Incentive regimes for IT companies.
- Dedicated infrastructure for IT companies.

Government Readiness

- Expenditure on education since education of users is an important ingredient.
- Use of ICT in Government functioning is critical, for example, use of ICT in public delivery systems enhances government usage significantly.
- Number of Government officials undertaking/had undertaken online training programmes.

- States that take initiative in opening up of technical colleges gain a competitive advantage over others in the ICT segment.

Government Usage

- Number of e-Governance projects undertaken by the State Government as a regulator and provider of infrastructure plays an enabling role. Government, as probably the largest single user, can help expand the market.

6.3 State-wise Strategies

This section attempts do draw out State-level strategies based on data received from the questionnaires sent to them. This is more of a guide and fine-tuning of policies may be attempted by the States for which DIT and NCAER would be willing to give necessary clarifications and suggestions.

6.3.1 Andhra Pradesh

Andhra Pradesh has emerged as the leader in the e-Readiness ranking of States during 2005 due to its outstanding performance in the Readiness Index.

Sub Index	Rank (Level 1,2,3.. 6)	Absolute Score
Readiness	L1	6.73
Environment	L2	2.39
Usage	L2	1.27

Key Indicators to be tackled to retain the leadership

Environment

The State needs to improve the market as well as infrastructure environments. The variables that emerge as important are:

- *Market*- Competition in the Telecom Sector- BSNL's dominant share and absence of other key private players is not facilitating unlike other States where market shares are more evenly distributed
- *Infrastructure inadequacy* - Low density of
  - Primary Schools
  - Computer Training Centers
  - Colleges
  - Internet Kiosks

is affecting the infrastructure environment of the State adversely.

Usage

In the Usage Index, Andhra Pradesh would need to address the area of individual usage.

Policy changes

- Impetus needs to be given to building physical infrastructure for facilitating individual education including ICT specific education as has been done in Chandigarh, Kerala and Karnataka.
- Chandigarh, Karnataka and Kerala have been able to accommodate major private players in the telecom space that is providing benefits to customers.

Action Plan

- The Government should aim at increasing the density of Internet kiosks as has been done by Tamil Nadu and Karnataka. Internet kiosks should be set up in schools, markets, etc. which would provide Internet facilities and training. The State may also associate with leading institutes for providing online training in computer courses as has been done in Kerala and the North-Eastern States.

6.3.2 Tamil Nadu

Tamil Nadu has remained a Leader State in e-Readiness in the last three years (2003- 05). The State has performed well in all the three Sub-Indices of Readiness

Sub-Index	Rank	Absolute Score
Environment	L1	4.09
Readiness	L1	3.83
Usage	L1	2.00

Key Indicators to be tackled

If the State has not been able to retain the Number 1 position in spite of being in Level 1 in all three Sub-Indices, it is because of the huge difference in the Readiness Sub-Index for Andhra Pradesh (6.79) and Tamil Nadu (3.83)

Readiness

Tamil Nadu emerges as a leader (Level 1) along with Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Kerala and Punjab. The State has performed well in Business and Government Readiness but its performance has been average in Individual Readiness. The areas that need to be addressed are:

- *Individual*- Open Internet Kiosks/ Centres State-wide as an important State-level programme to improve Individual Readiness e.g.
  - Akshaya- Kerala
  - North Eastern region- Sikkim CIC programme
- *Individual*- Encourage individuals to avail broadband connectivity/ computers and telephone ownership.

Environment

Although the State has performed well in the Political and Regulatory Environments, it needs to improve its performance in the Market and Infrastructure Environment indicators. In this category the variables that need to be addressed are:

- *Infrastructure inadequacy*- Low density of primary schools is affecting the infrastructure environment of the State
- *Market*- Competition in the telecom sector- BSNL's dominant share is affecting the environment as well as the usage of telecom services.

Usage

Although Tamil Nadu has emerged as a leader in the Usage Sub-Index of the e-Readiness ranking, its performance in the Leaders category has not been spectacular. It ranks the lowest amongst the Level 1 States of Delhi, Chandigarh, Kerala and Karnataka. Improvements in the following variables would enable the State to achieve a better usage score:

- *Individual* - Incentives for individuals to seek and adapt broadband connectivity
- *Business* - proportion of companies using ISDN connection and VSAT connection.

Policy changes

- Impetus needs to be given to facilitate setting up more schools for penetration and enrolment in primary education centers, as has been done in Chandigarh, Kerala and Karnataka.
- Government should provide fiscal incentives for computer manufacturing and its distribution to increase Individual Readiness in the State and to set up computer kiosks for access.
- Government-owned computer kiosks across the State with PPP model for improved Individual Readiness and Usage.
- Government to attract major private players in their telecom space to increase competition which will benefit customers.

Action Plan

- Set up more primary schools with the help of private players as has been done in Karnataka, Chandigarh and Delhi.
- The State Government to initiate discussions with private players to provide ICT infrastructure as has been done by Andhra Pradesh, Delhi, Goa, Punjab, Kerala, Maharashtra and Gujarat.
- The State Government can initiate discussions with financial institutions to provide loans at low interest rates to citizens to purchase computers. Taxes may be also reduced on ICT hardware to bring down the cost of computers in the State.
- The State can set up Internet kiosks throughout its territory as a follow-up policy measure. The Tamil Nadu Government should emulate Sikkim/ Akshaya-type programme, either with Government funds or PPP to open up as many Internet kiosks as possible.

6.3.3 Karnataka

Although Karnataka has remained a leader in e-Readiness over the past three years, the current year has seen other States which have improved their rankings within the Level 1 group.

Sub-Index	Rank	Absolute Score
Environment	L2	2.26
Usage	L1	2.73
Readiness	L1	3.56

Key Indicators to be tackled

Environment

Although, the State has performed well in the Usage and Readiness categories, its performance in the Environment Sub-Index needs improvement. In this category the variables that need to be addressed are:

- *Political and Regulatory*- Institutionalisation of monitoring and formulating e-Governance projects.

Policy changes

- Karnataka is the only State to have a Secretary-level official heading the e-Governance wing. It only needs to institutionalise the set up.

Action Plan

- A State e-Governance Mission Team (SeMT) needs to set up if not in place already.
- The Government also needs to evolve a transparent policy for PPP in e-Governance activities to initiate investments from the private sector in the ICT sector if not already done.

6.3.4 Kerala

The State has shown a marked improvement over the past three years and has emerged in the Leader Category in the current year.

Sub-Index	Rank	Absolute Score
Environment	L2	2.48
Usage	L1	2.91
Readiness	L1	3.03

Key Indicators to be tackled

Environment

The State's performance in the Environment Sub-Index has been average. Although the State has performed well in the market environment, it needs improvement in the political and regulatory environment. The issues that need to be addressed are:

- *Political and Regulatory*- proportion of policies taken up for e-Governance.

Readiness

The State is one of the key performers as far as the Readiness Sub-Index is concerned. It shares space with Andhra Pradesh, Karnataka and Tamil Nadu. However, improvements are required in the Business category. The variables that need to be taken care of are:

- *Business*-
  - Proportion of ICT exports to total exports from the State
  - Employment per IT Park in the State.

Usage

The State's performance in the Usage Category has been outstanding, second to only the two Union Territories of Delhi and Chandigarh. But Kerala needs to marginally improve its performance in the Individual and Business Categories to maintain its ranking. The variables that need to be addressed are:

- *Individual*- incentives for individuals to seek and adapt broadband connectivity
- *Business*- proportion of companies using
  - ISDN connection
  - VSAT connection

Policy changes

- Proactive political and regulatory environment seems to be the need of the hour
- Introduce a policy to facilitate ICT exports from the State and develop more IT parks as has been done by Karnataka, Maharashtra and Andhra Pradesh.

Action Plan

- The ICT policy of Kerala was last updated in 2001. The State Government needs to follow the footsteps of Gujarat, Haryana, Madhya Pradesh, Punjab and Chandigarh and revise its ICT policy frequently.
- The State Government also needs to give concessions to industries/companies for ICT activities similar to Haryana, Maharashtra, Chandigarh and Delhi.
- If there are no cyber laws that confer legal status to electronic transactions and documents in the State, they need to be put in place immediately.
- Provide incentives like tax concessions etc. to attract investment for the private sector to build IT parks as

has been done in Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka etc.

6.3.5 Chandigarh

Chandigarh's ranking has improved in the past three years and the State has graduated from the Aspiring Leader category in 2003 to a Leader in 2004 and 2005.

Sub-Index	Rank	Absolute Score
Environment	L1	4.55
Usage	L1	3.46
Readiness	L2	0.22

Key Indicators to be tackled

Environment

The State's performance in the Environment Sub-Index has been outstanding. Within this category the Government needs to address only the Political and Regulatory Environments to retain its position of a leader.

Readiness

The performance of the State in the Readiness Index has been only average, with the following areas needing improvement:

- *Individual*- Total number of:
  - Engineering / total technical students
  - MCA / total technical students
  - B.Sc. (Computer Science) / total technical students.
- *Government*- Government Expenditure on Secondary Education
  - Number of Ministries using ICT in governance process/ functioning.

Usage

Similar to the Environment Sub-Index, the performance of the State in the Usage Sub-Index has also been exceptionally good. To retain its position the Government needs to address the following:

- *Business*- proportion of companies using:
  - ISDN connection
  - VSAT connection
- *Government*- Proportion of policies taken up for ICT usage
  - Number of e-Governance projects undertaken.

Policy changes

- Provide impetus to higher education- especially in computer and engineering branches.
- Address the issues of IPR in the ICT policy as has been done by Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Rajasthan, Delhi, etc.
- Introduce ICT usage in governance and functioning of Ministries similar to Delhi, Karnataka, Rajasthan, Andhra Pradesh and Maharashtra.
- Like Kerala, Andhra Pradesh, Mahrashtra, and Tamil Nadu there is an increase in the number of e-Governance projects and their scope.
- Effectively monitor the existing e-Governance applications.

Action Plan

- Give financial support to colleges and give them incentives to increase the number of seats available in technical courses as has been done in Andhra Pradesh, Tamil Nadu, Kerala and Karnataka.
- Give financial support to private entrepreneurs for development of institutes of higher education similar to Delhi, Punjab, Kerala and Maharashtra.
- The State Government to initiate discussions with private players to provide ICT infrastructure in the State as has been done by Haryana, Tamil Nadu, Punjab, Kerala, Maharashtra and Gujarat.
- Coordinate with:
  - Karnataka for applications on land records
  - Maharashtra for application on property records, transportation, etc.
  - Andhra Pradesh for birth and death registration, trade, etc.
  - Madhya Pradesh for application of ICT in agriculture.

6.3.6 Maharashtra

The e-Readiness ranking of Maharashtra has witnessed a downward trend. The State has scored the lowest in the Leaders Group. To retain the position of leader the State needs to address the various issues related to Environment, Readiness and Usage of ICT.

Sub-Index	Rank	Absolute Score
Environment	L1	4.30
Readiness	L1	2.59
Usage	L2	1.01

Key Indicators to be tackled

Environment

The State has performed well in the Environment Sub-Index, second only to the Union Territory of Chandigarh. To retain its position, the State needs to continue the positive efforts made by it in the ICT sector. It is only the Market Environment which needs to be addressed.

- *Market*- Number of players in the cellular sector- only 4 major players in the State compared to seven in Chandigarh.

Readiness

The State is one of the key performers in the Readiness Sub-Index of the e-Readiness ranking along with Andhra Pradesh, Karnataka and Tamil Nadu. However, improvements are required in the Individual and Government Categories. The variables that need to be taken care of are:

- *Individual*- Total number of:
  - Engineering / total technical students
  - MCA / total technical students
  - B.Sc. (Computer Science) / total technical students.
- *Government*- Number of Ministries using ICT in governance process/ functioning.
  - Proportion of policies taken up for ICT Readiness.

Usage

The performance of the State in the Usage Sub-Index has been average. To move up a ladder in the Usage Category, the State Government needs to take care of the following issues of the Individual Category:

- *Individual*- Incentives for individuals to seek and adapt broadband connectivity.

Policy changes

- Chandigarh, Gujarat and Karnataka have been able to accommodate major private players in the telecom space that is providing benefits to the consumers.
- Provide impetus to higher education- special budget allocation for Computer and Engineering branches.
- Introduce ICT usage in governance and functioning of Ministries as in Delhi, Karnataka, Rajasthan, Andhra Pradesh and Maharashtra.

Action Plan

- Give financial support to colleges and give them incentives to increase the number of seats available in technical courses as has been done in Andhra Pradesh, Tamil Nadu, Kerala and Karnataka.
- Provide financial support to private entrepreneurs for development of institutes of higher education similar to Punjab, Kerala and Maharashtra.
- The State Government to initiate discussions with private players to provide ICT infrastructure in the State as has been done by Haryana, Tamil Nadu, Kerala and Gujarat.

6.3.7 Punjab

Punjab has emerged as the leader among the northern States in terms of overall performance in the last two years. This is an indication of the performance of the State in all spheres.

Sub-Index	Rank	Absolute Score
Environment	L1	3.62
Readiness	L1	2.75
Usage	L2	1.38

Key Indicators to be tackled

Environment

The State has performed well in the Environment Sub-Index and is among the Leader States like Chandigarh, Maharashtra and Tamil Nadu. The variables that need the attention of the State Government are:

- *Market*- Number of players in the
  - Telephone- only four major players in the State compared to twelve in Mahrashtra

  - Cellular Phones- only four major players in the State compared to seven in Chandigarh.
- *Infrastructure inadequacy* - Low density of
  - Post Office
  - Computer Training Centers.

Readiness

In the Readiness Sub-Index also, the State's performance has been admirable. Only the four southern States of Andhra Pradesh, Tamil Nadu, Karnataka and Kerala have performed better than Punjab in this category. The variables in which the State needs to improve marginally are:

- *Business*- Employment- Proportion of ICT Exports to total exports from the State
- *Government*- Number of Ministries using ICT in governance process/ functioning.

Usage

The performance of Punjab in Usage Sub-Index has been average. This is the area that the State Government needs to lay emphasis on. The variables that need to be tacked are:

- *Individual*- Incentives for individuals to seek and adapt broadband connectivity
- *Business*- Share of companies using ISDN.

Policy changes

- Government to attract major private players in their telecom space to increase competition which can benefit customers.
- Impetus needs to be given to physical infrastructure for facilitating penetration and enrolment in ICT education as has been given in Chandigarh, Kerala and Karnataka.
- Introduce a policy to facilitate ICT exports from the State.
- Introduce ICT usage in governance and functioning of Ministries similar to Delhi, Karnataka, Rajasthan, Andhra Pradesh and Maharashtra.
- Specific outlay in Budget for ICT awareness.

Action Plan

- The State Government to initiate discussions with private players to provide ICT infrastructure in the State as has been done by Haryana, Tamil Nadu, Punjab, Kerala and Gujarat.
- The Government should aim at increasing the density of Internet kiosks/ Computer Training Centers as has been done by Kerala and the North-Eastern States. Internet kiosks should be set up in schools, markets, etc., which would provide Internet facilities as well as training. It may also associate with leading institutes for providing online training in computer courses as has been done in North-Eastern States.
- The State Government also needs to give concessions to industries/companies for ICT activities similar to Haryana, Maharashtra, Chandigarh and Delhi.
- The State is to set up Internet kiosks throughout its territory as a follow up to policy measures

6.3.8 Delhi

The performance of the capital has been more or less consistent, which could be attributed to the continued efforts made by the State in the ICT sector. However, to improve its ranking drastically, the State Government needs to take more proactive steps in all spheres of e-Readiness, especially Readiness and Environment.

Sub-Index	Rank	Absolute Score
Usage	L1	4.93
Environment	L2	2.62
Readiness	L3	-0.33

Key Indicators to be tackled

Environment

The State has performed well in the Market and Infrastructure Sub-Indices, but needs overall improvement in the Political and Regulatory Environments.

- *Political and Regulatory*- Proportion of policies taken for
  - e-Governance
  - ICT companies
  - Security
  - Readiness.

The state needs to take positive steps to improve the readiness of the State. The variables that emerge as important are:

- *Individual*- Total number of:
  - Engineering / total technical students
  - B.Sc. (Computer Science) / total technical students
  - Business- Employment in IT companies/ total number of IT parks
  - Government- Percentage of top officials with online training programme
  - Proportion of policies taken up for ICT Readiness.

Usage

Delhi's performance in the Usage Sub-Index has been outstanding. It is only the Government Usage that needs to be addressed. The variable that needs the attention of the policy makers is the proportion of policies taken up for ICT usage.

Policy changes

- Proactive political and regulatory environment - need of the hour.
- Provide impetus to higher education – specially computer and engineering courses as has been done by Andhra Pradesh, Tamil Nadu, Karnataka, etc.
- Introduce a policy for development of IT parks as has been done by Karnataka, Maharashtra and Andhra Pradesh.
- Provide training to officers online as has been done in leader States and the North-Eastern region.
- Introduce e-Governance applications.

Action Plan

- ICT policy has to be revised frequently as has been done by Gujarat, Haryana, Madhya Pradesh, Punjab and Chandigarh.
- Have a supplementary budget for State-level e-Governance projects similar to Andhra Pradesh, Goa, Gujarat, Haryana, Karnataka, Kerala, Maharashtra and the North-Eastern States.
- The Government also needs to evolve a transparent policy for PPP in e-Governance activities to initiate investments from the private sector into the ICT sector if not already done.
- Add a section on Regulatory and Legal Policy in the ICT policy if not already in place.
- The State Government also needs to provided subsidised utilities to ICT firms similar to Andhra Pradesh, Gujarat, Haryana, Kerala, Maharashtra, Punjab, Tamil Nadu, Chandigarh and Rajasthan to attract private players into the ICT sector.
- Give financial support to colleges and give them incentives to increase the number of seats available in technical courses as has been done in Andhra Pradesh, Tamil Nadu, Kerala and Karnataka.
- Provide financial support to private entrepreneurs for development of institutes of higher education similar to Punjab, Kerala and Maharashtra.
- Provide incentives like tax concessions etc. to attract investment for the private sector to build IT parks as has been done in Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka, etc.
- The State Government to initiate discussions with private players to provide ICT infrastructure in the State as has been done by Haryana, Tamil Nadu, Punjab, Kerala, Maharashtra and Gujarat.
- Coordinate with:
  - Karnataka for applications on land records
  - Maharashtra for application on property records, transportation, etc.
  - Andhra Pradesh for birth and death registration, trade, etc.
  - Madhya Pradesh for application of ICT in agriculture.

6.3.9 Haryana

Haryana has shown constant improvement over the last three years and has upgraded from the 'Expectants' Group to the 'Aspiring Leaders' group. Haryana has been the IT destination in the North, with a number of incentives to business and people.

Sub Index	Rank	Absolute Score
Usage	L1	2.14
Environment	L2	2.96
Readiness	L2	0.64

Key Indicators to be tackled

Readiness

The performance of the State in the Readiness Sub-Index has been average. To improve its ranking the Government needs to lay emphasis on:

- *Government*- Government Expenditure on Secondary Education
  - Number of Ministries using ICT in Governance process/ functioning.

Usage

In the Usage Category, it is the individual usage that needs to be addressed. Incentives need to be given to individuals to seek and adapt broadband connectivity.

Policy Changes

- Provide impetus to higher education- specific budget allocation for secondary education.
- Introduce ICT Usage in governance and functioning of Ministries similar to Delhi, Karnataka, Rajasthan, Andhra Pradesh and Maharashtra.

Action Plan

- Increase outlay in the annual budget for secondary education.
- Fine tuning for ICT education by giving financial support to colleges and providing them incentives to increase the number of seats available in the technical courses as has been done in Kerala, Andhra Pradesh, Tamil Nadu and Rajasthan.

6.3.10 Goa

There has been a steady decline in the performance of Goa. However, it still retains it position of an aspiring leader due to its commendable performance in the Environment Sub-Index.

Sub Index	Rank	Absolute Score
Usage	L2	0.87
Environment	L1	3.33
Readiness	L4	-0.85

Key Indicators to be tackled

Environment

The State's performance in the Environment Sub-Index has been admirable and it needs to continue with the positive measures taken to create a conducive environment for ICT. The variables in which improvements are required are:

- *Market*- Number of players in the telecom sector and market share of each player- presence of only 2 major players and BSNL's dominant share is not facilitating the environment unlike other States where the markets are more evenly distributed
- *Political and Regulatory Environment*- proportion of policies taken up for ICT.

Readiness

The performance of the State in the Readiness Category has been poor. Though it has done well in the Individual Readiness Category, improvements are needed in the following variables of the Business and Government categories:

- *Business*- Employment in IT companies/ total number of IT parks
  - ICT Exports to total exports.
- *Government*- Proportion of policies taken for ICT readiness
  - Number of Ministries using ICT in governance process/ functioning
  - Percentage of top officials with online training programmes.

Usage

In the Usage Sub-Index the performance of the State has been average with improvements required in all the three categories. The variables that need to be addressed are:

- *Individual*- Incentives need to be given to individuals to seek and adapt broadband connectivity
- *Business*- Share of companies using
  - ISDN
  - VSAT
- *Government*- Accessibility of information and services by the citizens
  - Proportion of policies taken up for ICT usage.

Policy Changes

- Develop a policy environment for introduction of ICT applications in the State.
- Introduce a policy to facilitate ICT exports from the State.
- Address the issues of IPR in the ICT policy if not already done.
- Outlay in budget for ICT awareness.
- Introduce ICT usage in governance and functioning of Ministries similar to Delhi, Karnataka, Rajasthan, Andhra Pradesh and Maharashtra.
- Introduce a policy for development of IT parks as has been done by Karnataka, Maharashtra and Andhra Pradesh.
- Attract major private players into their telecom space to increase competition to benefit customers.

Action Plan

- The State Government also needs to give concessions to industries/companies for ICT activities similar to Haryana, Maharashtra, Chandigarh and Delhi.
- Provide incentives like tax concessions etc. to attract investment for the private sector to build IT parks as has been done in Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka, etc.
- The State Government to initiate discussions with private players to provide ICT infrastructure in the State as has been done by Haryana, Tamil Nadu, Punjab, Kerala, Maharashtra and Gujarat.
- Set up Internet kiosks throughout the State to facilitate accessibility of information and services to the citizens. Also coordinate with:
  - Karnataka for applications on land records
  - Maharashtra for application on property records, transportation, etc.
  - Andhra Pradesh for birth and death registration, trade, etc.
  - Madhya Pradesh for application of ICT in agriculture.

6.3.11 Gujarat

A downward trend is observed in the performance of Gujarat in e-Readiness. Although the performance of the State has been average on Usage and Environment, its ranking in the Readiness Sub-Index has been poor and some concrete steeps need to be taken by the Government to improve its ranking.

Sub Index	Rank (Level 1,2,3..6)	Absolute Score
Usage	L2	1.81
Environment	L2	1.68
Readiness	L4	-0.86

Key Indicators to be tackled

Environment

In the Environment Sub-Index, it is the market which the State needs to address. Also it has to continued with the positive measures taken so far to improve its performance and graduate to Level 1. The key variable to be tackled is:

- *Market*- Competition in Telecom sector- BSNL's dominant share and absence of other key private players is not facilitating unlike other States where the market shares are more evenly distributed.

Readiness

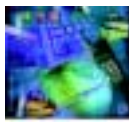
The State's performance in the Readiness Sub-Index has been unsatisfactory and it appears in Level 4 of this Category. The State Government needs to address both the Individual and Government Readiness to improve its ranking.

- *Individual*- Total number of B.Sc. (Computer Science) / total technical students
  - Percentage of total households with computers.
- *Government*- Percentage of top officials with online training programmes
  - Government Expenditure on Secondary Education
  - Number of Ministries using ICT in governance process/ functioning.

Usage

It is only the Business Usage in which the State needs to improve its performance. The variables that emerge important are:

- *Business*- Share of companies using
  - ISDN
  - VSAT



Policy Changes

- Fiscal incentives for computer manufacturing and distribution.
- Special budget allocations for secondary education and incentives for higher education especially engineering and computer-related courses.
- Outlay in budget for ICT Awareness.
- Policy for setting up Government kiosks to spread awareness.
- Develop a policy environment for introduction of ICT Applications.
- Introduce ICT Usage in governance and functioning of Ministries similar to Delhi, Karnataka, Rajasthan, Andhra Pradesh and Mahrashtra.
- Chandigarh, Karnataka and Kerala have been able to accommodate major private players in the telecom space that is providing benefits to the customers.

Action Plan

- The State Government can initiate discussions with financial institutions/ banks to provide loans at low interest rates to citizens for purchase of computers. Taxes may be also be reduced on ICT hardware to bring down the cost of computers
- Give financial support to colleges and give them incentives to increase the number of seats available in technical courses as has been done in Andhra Pradesh, Tamil Nadu, Kerala and Karnataka.
- Provide financial support to private entrepreneurs for development of institutes of higher education similar to Punjab, Kerala and Maharashtra.
- Give concessions to industries/companies for ICT activities similar to Haryana, Maharashtra, Chandigarh and Delhi.
- Aim at increasing the density of Internet kiosks as has been done by Tamil Nadu and Karnataka. Internet kiosks should be set up in schools, markets, etc. to provide Internet facilities as well as training. It can also associate with leading institutes for providing online training in computer courses as has been done in Kerala and the North-Eastern States.

6.3.12 Uttar Pradesh

Uttar Pradesh is the key performer of the Expectants Group in the e-Readiness index for 2005. The State has shown considerable improvement since last year.

Sub Index	Rank (Level 1,2,3..6)	Absolute Score
Usage	L3	-0.83
Environment	L2	0.58
Readiness	L2	1.38

Key Indicators to be tackled

Environment

The performance in the Environment Sub-Index is average and it needs to improve in the market, Political and Regulatory as well as Infrastructure Category. The variables that emerge important are:

- *Market*- Competition in telecom sector- BSNL's dominant share and absence of other key private players is not facilitating, unlike other States where market shares are more evenly distributed
- *Political and Regulatory Environment*- Proportion of policies taken up for ICT companies
- *Infrastructure*- Distance from the nearest:
  - Computer Training Center
  - Internet Kiosk.

Readiness

In the Readiness Category also, the State appears in Level 2. It needs to improve its performance in Individual, Business as well as Government Readiness to graduate to Level 1. The variables that need to be addressed are:

- *Individual*- Total number of engineering students/ total technical students
  - Open Internet Kiosks/ Centres State-wide as an important State-level programme to improve Individual Readiness e.g.
  - Akshaya- Kerala
  - North-Eastern region- Sikkim CIC program
  - Encourage individuals to avail broadband connectivity/ computers and telephone ownership
- *Business*- ICT Exports to total exports
- *Government*- number of top officials with online training program
  - Percentage of Government expenditure on secondary education

Usage

The performance of the State has been satisfactory in the Usage Sub-Index and it needs to improve in all spheres. However the variables in which drastic measures are needed are:

- *Individual*- Incentives need to be given to individuals to seek and adapt broadband connectivity
- *Government*- Accessibility of information by the citizen.

Policy Changes

- Specific policy for introduction of Computer Information Centers (CICs).
- Special budget allocations for secondary education and incentives for higher education, especially engineering courses.
- Outlay in budget for ICT Awareness.
- Policy for setting up Government kiosks for access to spread awareness.
- Chandigarh, Karnataka and Kerala have been able to accommodate major private players in the telecom space that is providing benefits to the customers.
- Introduce a policy to facilitate ICT exports from the State.

Action Plan

- The ICT Policy was last updated in 2004. The state government needs to follow the footsteps of Gujarat, Haryana, Madhya Pradesh, Punjab and Chandigarh and revise its ICT Policy.
- The Government should aim at increasing the density of Internet kiosks as has been done by Tamil Nadu and Karnataka. Internet kiosks should be set up in schools, markets, etc. which would provide Internet facilities as well as training. It can also associate with leading institutes for providing on- line training in computer courses as has been done in Kerala and North-Eastern States.
- Give financial support to colleges and give them incentives to increase the number of seats available in technical courses as has been done in Andhra Pradesh, Tamil Nadu, Kerala and Karnataka.
- Provide financial support to private entrepreneurs for development of institutes of higher education similar to Punjab, Kerala and Maharashtra.
- The State Government also needs to give concessions to industries/companies for ICT activities similar to Haryana, Maharashtra, Chandigarh and Delhi.
- The State Government can initiate discussions with financial institutions/ banks to provide loans at low interest rates to citizens for purchase of computers. Taxes may be also be reduced on ICT hardware to bring down the cost of computers in the State.

6.3.13 Pondicherry

The e-Readiness ranking of Pondicherry has remained unchanged over the last two years. Besides Environment, the State's performance in the other two Sub-Indices has been unsatisfactory.

Sub Index	Rank (Level 1,2,3..6)	Absolute Score
Usage	L4	-1.42
Environment	L2	1.29
Readiness	L4	-1.94

Key Indicators to be tackled

Environment

The State's performance has been average in the Environment Sub-Index and the State needs to improve in all the three categories- Market, Political and Regulatory and Infrastructure. The variables that need to be addressed are:

- *Market*- Competition in cellular sector- BSNL's dominant share is not facilitating unlike other States where market shares are more evenly distributed
- *Political and Regulatory Environment*- Proportion of policies taken for e-Governance
  - Proportion of policies taken for ICT companies
  - Proportion of Security Policies.
- *Infrastructure*- Distance from the nearest:
  - Computer Training Centre
  - Internet Kiosk.

Readiness

In all the three categories of the Readiness Sub-Index, the performance has not been satisfactory and the variables that emerge important are:

- *Individual*- Total number of engineering students/ total technical students encourage increasing number of households to own computers
- *Business*- Employment in IT companies/ total number of IT parks
- *Government*- Proportion of policies taken for ICT readiness
  - Number of Ministries using ICT in governance process/ functioning.
  - Percentage of top officials with online training programmes.

Usage

In usage also the State has performed poorly and improvements are desirable in all the three categories - Individual, Business and Government. The variables that need to be tackled are:

- *Individual*- Incentives need to be given to individuals to seek and adapt broadband connectivity
- *Business*- hare of companies using
  - ISDN
  - VSAT
- *Government*- Status of accessibility of information and services by the citizens
  - Proportion of policies taken up for ICT usage
  - Number of e-Governance projects undertaken.

Policy Changes

- The ICT Policy of the Pondicherry was last updated in 1999. The State Government needs to follow the footsteps of Gujarat, Haryana, Madhya Pradesh, Punjab and Chandigarh and revise its ICT policy frequently.
- Address the issues of IPR in the ICT policy as has been done by Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Rajasthan, Delhi, etc.
- An effective legal machinery to prevent piracy of ICT products to be put in place.
- Government-owned computer kiosks across the State with PPP (Public- Private Partnership) model for improved individual readiness and usage.
- Provide impetus to higher education, especially in engineering.
- Chandigarh, Karnataka and Kerala have been able to accommodate major private players in the telecom space that is providing benefits to the customers.
- Introduce ICT usage in governance and functioning of Ministries similar to Delhi, Karnataka, Rajasthan, Andhra Pradesh and Maharashtra.
- Emulate Kerala, Andhra Pradesh, Maharashtra, and Tamil Nadu in increasing the number and scope of e-Governance projects.
- Provide online training to officers in government organisations as has been done in leader States and the North-Eastern region.
- Effectively monitor the existing e-Governance applications.
- Introduce a policy for development of IT parks as has been done by Karnataka, Maharashtra and Andhra Pradesh.

Action Plan

- The ICT Policy of the State does not have a section on Regulatory, Legal and Security Policy -the State Government needs to add these sections while reviewing the policy.
- Have a Supplementary Budget for State-level e-Governance projects similar to Andhra Pradesh, Goa, Gujarat, Haryana, Karnataka, Kerala, Maharashtra and the North-Eastern States.
- The Government also needs to evolve a transparent policy for PPP in e-Governance activities to initiate investments from the private sector into ICT if not already done.
- The State can set up internet kiosks as a follow-up on policy measures. The Tamil Nadu Government should emulate the Sikkim and Akshaya programmes, either with Government funds or PPP to open up as many internet kiosks as possible in the State.
- Give financial support to colleges and give them incentives to increase the number of seats available

in technical courses as has been done in Andhra Pradesh, Tamil Nadu, Kerala and Karnataka.

- Give financial support to private entrepreneurs for development of institutes of higher education similar to Delhi, Punjab, Kerala and Maharashtra.
- The State Government to initiate discussions with private players to provide ICT infrastructure in the State as has been done by Haryana, Tamil Nadu, Punjab, Kerala, Maharashtra and Gujarat.
- Provide incentives like tax concessions to attract investment for the private sector to build IT parks as has been done in Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka, etc.
- Coordinate with:
  - Karnataka for applications on land records
  - Maharashtra for application on property records, transportation, etc.
  - Andhra Pradesh for birth and death registration, trade, etc.
  - Madhya Pradesh for application of ICT in agriculture.

6.3.14 Rajasthan

Rajasthan has shown tremendous improvement over last year's e-Readiness ranking and has graduated from the Average Achiever's Category to the Expectants Category.

Sub Index	Rank (Level 1,2,3...6)	Absolute Score
Usage	L2	0.18
Environment	L3	-0.61
Readiness	L3	-0.05

Key Indicators to be tackled

Environment

In the Environment Sub-Index the State has done well in the Market Category, but needs improvement in the Political and Regulatory and Infrastructure Environment. The variables that are to be tackled are:

- *Political and Regulatory*- Proportion of policies taken for ICT companies
- *Infrastructure*- Distance from the nearest:
  - Computer training Centre
  - College
  - Internet Kiosk
  - Medical Store

Readiness

Individual and Government Readiness needs to be addressed in the Readiness Sub-Index. The variables that emerge important are:

- *Individual* - Open Internet kiosks/Centres as an important State-level programme to improve Individual Readiness e.g.
  - Akshaya- Kerala
  - North-Eastern region- Sikkim CIC programme
  - Encourage individuals to avail broadband connectivity/computers and telephone ownership
- *Government*- Number of Ministries using ICT in governance process/functioning.

Usage

The State has performed well in the Usage Sub-Index and substantial improvement is required only in the Individual Category.

- *Individual*- Incentives for individuals to seek and adapt broadband connectivity.

Policy Changes

- Continue the progressive steps adapted till date.
- Impetus needs to be given to physical infrastructure for facilitating individual education enrolment, including ICT-specific education, as has been done in Chandigarh, Kerala and Karnataka.
- Proactive policy by the Government for Infrastructure Development.
- Provide fiscal incentives for computer manufacturing and its distribution to increase Individual Readiness and to set up computer kiosks for access.
- Government-owned computer kiosks across the State with PPP model for improved Individual Readiness and Usage.
- Introduce ICT usage in governance and functioning of Ministries similar to Delhi, Karnataka, Rajasthan, Andhra Pradesh and Maharashtra

Action Plan

- The ICT Policy of the state does not have a section on Regulatory and Legal Policy. The State Government to added these sections while reviewing the policy.
- Opening up of more colleges with the help of private players needs to be in place as has been done in Karnataka and Tamil Nadu.
- The Government should aim at increasing the density of Internet kiosks as has been done by Tamil Nadu and Karnataka. They should be set up in schools, markets, etc. which would provide Internet facilities as well as training. It can also associate with leading institutes for providing online training in computer courses as has been done in Kerala and the North-Eastern States.
- The State Government to initiate discussions with private players to provide ICT infrastructure as has been done by Andhra Pradesh, Tamil Nadu, Delhi, Goa, Punjab, Kerala, Maharashtra and Gujarat
- The State government can initiate discussions with financial institutions/banks to provide loans at low interest rates to citizens for purchase of computers. Taxes may be also be reduced on ICT hardware to bring down the cost of computers in the State

The Sate can set up Internet kiosks as a follow-up on policy measures.

6.3.15 Chattisgarh

Among the new States of Jharkhand, Uttaranchal and Chattisgarh created in 2000, Chattisgarh has shown maximum potential. It ranks first in the group.

Sub Index	Rank (Level 1,2,3…6)	Absolute Score
Usage	L3	-0.32
Environment	L3	0.01
Readiness	L4	-0.97

Key Indicators to be tackled

Environment

In the Environment Sub-Index it is the Political and Regulatory Environment and the Infrastructure Environment that the State needs to lay emphasis on. The variables identified are:

- *Political and Regulatory*- proportion of policies taken up for:
  - ICT companies
  - Security
- *Infrastructure*- Distance from the nearest:
  - Post Office
  - Public telephone
  - Computer Training Centre
  - College
  - Medical Store.

Readiness

In the Readiness Sub-Index all the three categories - Individual, Business and Government - need to be improved upon. The variables that are to be addressed are:

- *Individual*- Total number of :
  - Engineering students/total technical students
  - MCA students/total technical students
- Open Internet Kiosks/ Centres as an important State-level programme to improve Individual Readiness
  - e.g. Akshaya- Kerala
  - North-Eastern region- Sikkim CIC program
- Encourage individuals to avail broadband connectivity/computers and telephone ownership
- *Business*- Proportion of ICT Exports to total exports from the State
- Employment per IT Park
- *Government*- Government expenditure on secondary education
  - Number of Ministries using ICT in governance process/functioning.
  - Percentage of top officials with online training programmes.

Usage

In the Business Usage Category, the State has done well. However, it needs to improve its Individual and Government Usage. The variables that emerge important are:

- *Individual*- Incentives for individuals to seek and adapt broadband connectivity
- *Government*- Accessibility of information and services by the citizens
  - Number of e-Governance projects undertaken.

Policy Changes

- Address the issues of IPR in the ICT Policy as has been done by Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Rajasthan, Delhi, etc.
- An effective legal machinery to prevent piracy of ICT products to be put in place.
- Impetus needs to be given to physical infrastructure for facilitating individual education enrolment including ICT-specific education as has been done in Chandigarh, Kerala and Karnataka.
- Provide impetus to higher education.
- Government to provide fiscal incentives for computer manufacturing and its distribution to increase Individual Readiness and set up computer kiosks for access.
- Government-owned computer kiosks across the State with the PPP model for improved Individual Readiness and Usage.
- Proactive Political and Regulatory Environment the need of the hour.
- Introduce a policy to facilitate ICT exports from the State and set up more IT parks as has been done by Karnataka, Maharashtra and Andhra Pradesh.

Action Plan

- The ICT Policy of the State does not have a section on Security and Legal Policy. The State Government to added these sections while reviewing the policy.
- Give financial support to private entrepreneurs to improve the density of colleges and also for equity in distribution of education as has been done in Karnataka Chandigarh and Delhi.
- Open up of more colleges with the help of private players as has been done in Karnataka and Tamil Nadu.
- The Government should aim at increasing the density of Internet kiosks as has been done by Tamil Nadu and Karnataka. Internet kiosks should be set up in schools, markets, etc. which would provide Internet facilities as well as training. It can also associate with leading institutes for providing online training in computer courses as has been done in Kerala and the North-Eastern States.
- The State Government to initiate discussions with private players to provide ICT infrastructure as has been done by Andhra Pradesh, Tamil Nadu, Delhi, Goa, Punjab, Kerala, Maharashtra and Gujarat.
- The State Government can initiate discussions with financial institutions/ banks to provide loans at low interest rates to citizens for purchase of computers. Taxes may be also be reduced on ICT hardware to bring down the cost of computers.
- The State can set up Internet kiosks as a follow-up on policy measure.
- The State Government also needs to give concessions to industries/companies for ICT activities similar to Haryana, Maharashtra, Chandigarh and Delhi.
- If there are no cyber laws that confer legal status to electronic transactions and documents in the State, they need to be in place immediately.
- Provide incentives like tax concessions etc to attract investment for the private sector to build IT parks as has been done in Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka, etc.

6.4 Key Findings

- Our analysis of the e-Readiness of the States reveals that the southern States - Andhra Pradesh, Karnataka, Tamil Nadu and Kerala - have remained leaders over the three-year period, while the northern States of Chandigarh, Haryana, and Rajasthan have shown vast improvement. Apart from these, Sikkim from the North-Eastern region has done exceedingly well. Wide coverage of community information centers (CICs) over the last named State has made an enormous impact.
- The Output and Employment Multipliers calculated for key Indian States show that ICT plays an important role in States, irrespective of their stage of development. Developing States like Rajasthan and Madhya Pradesh have a high Employment Multiplier and Low Output Multiplier indicating the existence of high involvement of skilled labour in the IT services area, whereas the high “vertical linkages” in the developed States of Maharashtra

and Gujarat is shown by the high Output Multiplier and Low Employment Multipliers.

- Another important observation is that old technologies are demand driven and take time to penetrate whereas new technologies like ICT are more supply driven in the sense that the rate of diffusion is very high in this technology in both developed and developing regions. Thus, a proactive role by the Governments of all States would yield positive results in economic development. Therefore, there is greater scope in these technologies for diffusion agents to influence the diffusion process, implying that the outlay for the ICT sector should be increased substantially in order to achieve maximum benefits of ICT.

Annexures

Principal Component Analysis

The Principal Component Analysis is a multivariate choice method. This approach develops a composite index by defining a real valued function over the relevant variables objectively. Given a set of explanatory variables, if we have to select the most important variable or a limited number of variables from the set, Principal Component Analysis helps. The principle of this method lies in the fact that when different characteristics are observed about a set of events, the characteristic with more variation explains more of the variation in the dependent variable compared to a variable with lesser variation in it. Therefore, the issue is one of finding weights to be given to each of the concerned variables. Weight to be given to each of the variables is determined on the principle that the variation in the linear composite of these variables should be the maximum. Once the weight to be given to each of these variables is decided, we can focus on the important variables in order to reduce the noise in the data. A set of assumptions has been used in our method of construction of a composite index. These are:

- the condition of *weak pareto rule* demands that when a state registers values of indicators uniformly higher than those of the other - the former should have a higher ranking than the latter ones;
- the condition of *non-dictatorship* implies that no single indicator should be considered so significant as to determine the final ordering all by itself;
- the condition of *unrestricted domain* implies that the method should be capable of giving the final ranking for all possible data matrices;
- the final condition is that of *independence* from irrelevant alternatives, which demands that while ranking two , the decision must be guided by the values of the indicators for these units under study alone and not by any other irrelevant phenomenon

Given these general assumptions, the composite index is defined as,

$$C_i = W_1 x_{11} + W_2 x_{12} + W_3 x_{13} + \ldots\ldots + W_n x_{1n}$$

or, $$C_i = \sum W_i x_{ij},$$

where C_i is the composite index for the i^{th} observation, W_j is the weight assigned to j^{th} indicator and x_{ij} is the observation value after elimination of the scale bias.

It is evident from the above formula that to compute the composite index two major components are to be known, i.e., the weights assigned to the indicators and the observation values after elimination of the scale bias for the available indicators. These two have been discussed below in detail.

Elimination of scale bias

Variables chosen for any analysis are usually measured in different units and are generally not additive. Hence, it is necessary to convert them in some standard comparable units such that the initial scale chosen for measuring them do not bias the results. The method adopted to standardise the variable is

$$x_{ij} = (X_{ij} - X_m / \sigma)$$

where, x_{ij} is the scale free observation, X_{ij} is the original observation and X_m is the mean of the series and σ is the standard deviation.

The transformed series now would be scale free and would have a mean of zero and a standard deviation of unity.

Assigning weights objectively using Factor Analytic Model

Once the bias of measurement is removed from the observations, the crucial problem that remains is that of assigning appropriate weights to the selected indicators.

If one has sufficient insight into the nature and magnitude of inter-relationships among the variables and their implications, one might choose to determine the weights on the basis of independent judgement. This way of constructing an index stands exposed to subjectivity. Assigning equal weight (or no weight) would imply assumption of equal correlation of each indicator with the composite index of importance which would hardly be a realistic approach in this case. Therefore, in this analysis, the weights for individual indicators have been assigned on the basis of the factor analytic model.

Factor Analysis or Principal Component Analysis is a tool used to construct a composite index in such a way that the weights given maximise the sum of the squares of correlation (of the indicators with the composite index). The application of Factor Analysis in this specific case has been accepted in 'objective ranking' of the regions. This method enables one to determine a vector known as the first Principal Component or Factor, which is linearly dependent on the variables, having the maximum sum of squared correlation with the variables.

The weights given to the indicators are chosen in such a way so that the Principal Components satisfy two conditions:

a). The number of Principal Components are equal to the number of indicators and are uncorrelated or orthogonal in nature.

b). The first Principal Component or P_1 absorbs or accounts for the maximum possible proportion of variation in the set of the indicators. This is the reason why it serves as the ideal measure of composite index.

Method

Step 1 We start by taking the simple correlation coefficients of the *k* numbers of indicators. These correlation coefficients may be arranged in a table, which is called the correlation table. The elements of the diagonal would be unity as they are the self-correlated, i.e., the correlation of each X_i with itself ($r_{xi\ xi} = 1$ for all the *i*'s). The correlation matrix is symmetrical, i.e., the elements of each row are identical to the elements of the corresponding columns, since $r_{xi\ xj} = r_{xj\ xi}$.

Correlation Table of the set of K Variables

	X_1	X_2	X_3	X_k	$\Sigma^k_i r_{xi\ xj}$
X_1	$r_{x1\ x1}$	$r_{x1\ x2}$	..	$r_{x1\ xk}$	$\Sigma^k_i r_{x1\ xi}$
X_2	$r_{x2\ x1}$	$r_{x2\ x2}$	..	$r_{x2\ xk}$	
"	..	..	..	..	
"	..	..	..	..	
X_k	..	..	..	..	
"	$r_{xk\ x1}$	..	..	$r_{xk\ xk}$	
$\Sigma^k_i r_{x1\ xj}$	$\Sigma^k_i r_{xi\ x1}$	$\Sigma^k_i r_{xi\ x2}$	$\Sigma^k_i r_{xi\ x3}$	$\Sigma^k_i r_{xi\ xk}$	$\Sigma^k_i \Sigma^k_i r_{xi\ xj}$

Step 2 Sum of each column (or row) of the correlation table is computed, obtaining *k* number of sums of simple correlation coefficient.

$$\Sigma^k_i r_{xi\ xj} = \Sigma^k_i r_{xi\ xj}$$

Step 3 We compute the sum total of the column (or row) sums-

$$\Sigma^k_i \Sigma^k_j r_{xi\ xj}$$

and we take its square roots.

Step 4 Finally, we obtain the factor loadings for the first Principal Component P_1 by dividing each column (or row) sum by the square root of the grand total.

$$a_{ij} = (\Sigma^k_i r_{xi\ xj}) / (\sqrt{\Sigma^k_i \Sigma^k_i r_{xi\ xj}})$$

It should be clear that the loadings thus obtained are the correlation coefficients of the respective indicator with the composite index.

Step 5 The P_1 or the first Principal Component is constructed in the following way

$$P_1 = a_{11} x_1 + a_{12} x_2 + \ldots\ldots\ldots + a_{1k} x_k$$

Step 6 The sum of the squares of the loading of the Principal Component is called the latent root (or Eigen Value) of this component and are denoted by the Greek letter *l* with the subscript of the Principal Component to which it refers. For example, the latent root of the first Principal Component P_1 is

$$l_1 = [\text{latent root of } P_1]$$
$$= \Sigma_i^k 1^2_1$$
$$= 1^2_1 + 1^2_2 + \ldots + 1^2_k$$

The sum of the latent root of all the Principal Components would be equal to the number of indicators:

$$\Sigma_i^k l_i = k$$

The importance of the latent root or the eigen value lies in the fact that it expresses the percentage of variation in the set of indicators the Principal Component explains. If for example, $l_1 = 2.797$ and the number of variables are 8, then the P_1 expresses -

$l_1 / k = (2.797/8)*100 = 35\ \%$ of the variations of the set of 8 variables.

Tests of significance of the loadings: the loadings in our study have been tested based on the levels of significance of the Pearson Correlation coefficients.

Multi-Stage Principal Component Analysis

In this particular exercise, we have attempted a method of normal or single stage Principal Component Analysis as well as the multi-stage Principal Component Analysis. For performing the single stage Principal Component Analysis, all the indicators are taken together and the procedure discussed above is followed. In case of multi-stage Principal Component Analysis selected variables are divided into well-defined sub-groups depending on the nature of the indicators. Within a sub-group, they have a high degree of inter-correlation, while the canonical correlation between pairs of sub-groups is low on an average. The Principal Component Analysis has then been applied to each of these sub-groups of variables. The first Principal Components obtained from different sub-groups have been treated as a set of new variables and combined at a second stage to obtain the Final Composite Index. It has been argued that this method overcomes the necessity of taking more than one Principal Component in the analysis, since the correlation among the variables in a subgroup are generally high and consequently, the first Principal Component explains an 'adequate' proportion of the variation in the data matrix. However, the results are almost similar in both the procedure followed in this study which are discussed in the section where the results are analysed.

Input Output Table: Step and Hypothetical Illustration

Input Output Table Flow Matrix- Hypothetical Illustration

To explain the concept a highly simplified example is shown in Table below, which contains only four industries. Industries shown in rows are producing industries where as those shown in columns are users.

For example, row 1, industry 1, indicates that it produced Rs 20 lakh worth of products used within the industry; it produced Rs 65 lakh worth sold to industry 2, Rs 50 lakh worth sold to industry 3 and Rs 10 lakh worth sold to industry 4. These intermediate uses totalled Rs 145 lakh. Final products were valued at Rs 245 lakh so total output was Rs 390 lakh. Similarly industry 3 sold Rs 60 lakh worth of output to industry 2, and so on.

Simplified Input-Output Table (Flow Matrix), Value in Rs lakh

As producers	As users						
	Industry 1	Industry 2	Industry 3	Industry 4	Total intermediate uses	Final use	Total use
Industry 1	20	65	50	10	145	245	390
Industry 2	0	30	0	0	30	260	290
Industry 3	50	60	70	15	195	50	245
Industry 4	40	15	50	70	175	200	375
Total Purchases	110	170	170	95	545		
Value added	280	120	75	280		755	
Total output	390	290	245	375			1300

Each producer is also user of intermediate goods, and its purchases are shown in the columns of the I-O table. For example, industry 2 bought Rs 65 lakh worth of industry 1 products and also Rs 30 lakh from within the industry, Rs 60 lakh from industry 3 and Rs 15 lakh from industry 4. Total purchases for this industry were Rs 170 lakh. These industries added value of Rs 120 lakh, so total output was valued at Rs 290 lakh. This must be equal to the total output shown in row 2 for industry 2. Each row shows output allocated according to uses (including final demand), whereas each column shows the costs and profit of producing the output. Row 6 gives value-added by each industry and the sum of its entries; if extended to all sectors in the I-O Table of the Indian economy must yield the GDP. In this form the I-O table is also called the **flow matrix.**

Input Output Table Coefficient Matrix- Hypothetical Illustration

To turn the input-output matrix into a usable tool for calculating the tax multiplier, a crucial assumption is required. If it is assumed that the technology parameters like the ratio of purchases and value added to total production is fixed for every industry as of now and will prevail in future for next 5 years, then this accountant's snapshot of costs becomes an economist's production function with fixed coefficients. It says that for an industry, inputs and costs must expand proportionately with outputs. Input- Output Table above can be converted into matrix of ratios called input-output coefficients; this is done in table below. Each column in table has been divided through by its total, so that the second column, for

example, now gives the ratios of inputs to output for industry 2: each unit requires 0.23 of industry 1 output, 0.10 of industry 2 output, 0.21 of industry 3 output, 0.05 of industry 4 output and 0.41 of value added.

Coefficient Matrix

As producers	Industry 1 (X_1)	Industry 2 (X_2)	Industry 3 (X_3)	Industry 4 (X_4)
Industry 1 (X_1)	0.05	0.23	0.20	0.03
Industry 2 (X_2)	0.00	0.10	0.00	0.00
Industry 3 (X_3)	0.13	0.21	0.29	0.04
Industry 4 (X_4)	0.10	0.05	0.20	0.18
Total Purchases	0.28	0.59	0.69	0.25
Value added	0.72	0.41	0.31	0.75
Total output	1.00	1.00	1.00	1.00

The resulting table of coefficients, known as the **A matrix,** can be seen as a set of production functions for each sector shown in the columns. These fixed coefficient production functions are often called **Leontief production functions.** The elements (coefficients) of I-O tables are usually designated aij; the subscripts referring to the row (i, for input) and column (j) in that order. Thus, a12 is the output of sector 1 needed per unit of sector 2 output, a value of 0.23, while a43 is the 0.20 unit of sector 4 output needed to produce one unit of sector 3 goods. This matrix is suited to tracing direct incidence of taxes.

Input Output Table: Leontief Inverse to Obtain Output Multipliers-Hypothetical Illustration

Thus, for any level of output of the four industries, which we now label X1 through X4, the amount of X1 required would be

$$X1 = a11\ X1 + a12\ X2 + a13\ X3 + a14\ X4 + F1$$

This says that enough X1 must be produced to cover the input needs of each of the producing sectors, given by the input-output coefficients times the level of output, or aij Xj, plus the amount of X1 needed for final demand F1. The same is true for each of the other products, so the complete model is

$$X1 = a11\ X1 + a12\ X2 + a13\ X3 + a14\ X4 + F1$$
$$X2 = a21\ X1 + a22\ X2 + a23\ X3 + a24\ X4 + F2$$
$$X3 = a31\ X1 + a32\ X2 + a33\ X3 + a34\ X4 + F3$$
$$X4 = a41\ X1 + a42\ X2 + a43\ X3 + a44\ X4 + F4$$

F1 through F4 are the final goods required for the economy. The above set of equations may be put in the matrix form as given below:

$$\begin{bmatrix} X1 \\ X2 \\ X3 \\ X4 \end{bmatrix} = \begin{bmatrix} a11 & a12 & a13 & a14 \\ a21 & a22 & a23 & a24 \\ a31 & a32 & a33 & a34 \\ a41 & a42 & a43 & a44 \end{bmatrix} \begin{bmatrix} X1 \\ X2 \\ X3 \\ X4 \end{bmatrix} + \begin{bmatrix} F1 \\ F2 \\ F3 \\ F4 \end{bmatrix}$$

where X= A X + F

X= Gross Output Vector
F= Final Demand Vector
A= Technology matrix (also known as direct requirements matrix)
aij = quantity of good i require directly in the production of one unit of commodity j.

The total (direct and indirect) input requirements needed to produce one additional rupee of output by each industry is obtained from the total requirements matrix.

Using the following identities

X= (I-A)-1 F

X= (rij) F

Where rij is known as Leontief inverse or total requirements matrix.

Assume the Total Requirements Matrix to be as follows:

Leontief Inverse- Total Requirements Matrix-General Formulation

		Producing Industries			
		Industry 1	**Industry 2**	**Industry 3**	**Industry 4**
Supplying Industries	Industry 1	r_{11}	r_{12}	r_{13}	r_{14}
	Industry 2	r_{21}	r_{22}	r_{23}	r_{24}
	Industry 3	r_{31}	r_{32}	r_{33}	r_{34}
	Industry 4	r_{41}	r_{42}	r_{43}	r_{44}
	Output multipliers	Σr_{i1} where i=1,2,3,4	Σr_{i2} where i=1,2,3,42	Σr_{i3} where i=1,2,3,4	Σr_{i4} where i=1,2,3,4

For the hypothetical A matrix given above, the Leontief Inverse is as follows:

Leontief Inverse- Total Requirements Matrix-Hypothetical Example

		Producing Industries			
		Industry 1	**Industry 2**	**Industry 3**	**Industry 4**
Supplying Industries	Industry 1	1.10	0.36	0.33	0.06
	Industry 2	0	1.11	0	0
	Industry 3	0.21	0.41	1.49	0.08
	Industry 4	0.19	0.21	0.40	1.25
	Output multipliers	1.50	2.09	2.22	1.39

The column total gives the output multiplier for that industry.

The steps involved to arrive at the output and employment multipliers are succinctly given below:

Step 1: Setting up the Flow Matrix tracing the flow of output from one industry to another and from industries to final users. In the flow matrix, each row shows output allocated according to uses (including final demand), whereas each column shows the costs and profit of producing the output.

Step 2: Deducing the Coefficient Matrix - When flows are converted into ratios column-wise the resultant matrix is the Coefficient Matrix. (also known as the A matrix). These fixed coefficients imply a Leontief production function.

Step 3: Arriving at the Leontief Inverse Matrix (I-A)-1 also known as the Total Requirements Matrix captures the total (Direct and Indirect) input requirements needed to produce one additional unit of output by each industry.

Step 4: Output Multiplier, defined as the total increase in output generation for one unit increase of final demand in a particular sector can also be obtained from the Leontief Inverse. In the instance of backward linkage, use of a particular commodity induces demand for increased production of inputs which in turn require second stage inputs. These second stage inputs would require further inputs. The geometric progression of "output" at each stage is summed up to obtain the output multiplier effect.

Step 5: Employment Multiplier has also been specified in man-years of additional employment created for an increased output of Rs. 1 lakh of the concerned sector.

List of Indicators for State Level Assessment

Indicators for Environment

Indicators	Sub-Indicators	Indicators of Significance
Market Environment	• ICT exports / total exports • *Competition in the ISP sector:* - Number of Players - Market share of lead players (in per cent) • *Competition in the cellular sector:* - Number of Players - Market share of lead players (in per cent) • *Competition in the Telecom sector:* - Number of Players - Market share of lead players (in per cent) • Range of price charged for internet connection (per 100 hours)	• Number of players in the Telecom sector. • Number of players in the Telecom sector. • Number of players in the ISP sector • Number of players in the Cellular sector
Political and Regulatory Environment	• Does IT policy exist? - When was the ICT Policy initiated? - How often is the ICT Policy revised? • Is there a section in the following sections: - Enabling Policy - Regulatory Policy - Legal Policy - Security Policy • Is there a Performance Matrix of the state for monitoring policies? • Is the issue of IPR addressed in the ICT policy? • Is there effective legal machinery to tackle the problem of piracy of ICT products? • Does a state level action plan exist? • State e-governance mission team (SeMT) been set up for e-governance projects? • Is there a transparent policy for public private partnerships (PPP) for e-governance activities? • Has the government given support to ICT in way of initiatives, priorities, policies and interests? • Time taken to get clearance for starting an ICT business • Does a supplementary budget exist for state level projects? • Has an e-governance committee been set up? • Is there a Mission/Objectives/Strategies and Tactics (MOST) document for e-governance? • Have you enacted the IT ACT 2000 which is applicable to all states? • Are there cyber laws that confer legal status to electronic transactions and documents?	• Proportion of policies taken for e-governance • Proportion of policies taken for ICT companies • Proportion of Security Policies

Political and Regulatory Environment	• Is there a law on regulation of digital signatures and encryption? • Have any concessions been given to industries/companies for ICT activities? • Are subsidized utilities provided to ICT firms? • Any sales tax concessions have been given to ICT companies? • Give the total number of complaints/cases registered relating to IPR • Number of initiatives taken for telecom regulation and ICT trade policy? • Are there any public private partnerships for development of ICT infrastructure?	
Infrastructure Environment	• Number of villages with Village Public Telephones (VPTs) / total villages. • Number of public pay telephones / '000 population. • Waiting time for telephone lines (Number of days). • Total number of telephone mainlines / total population. • Total number of cellular connections / '00 fixed lines. • Number of schools with Internet access / total schools • Number of schools with Computer labs access / total schools. • Number of schools with websites / total schools. • Number of colleges with Internet access / total colleges. • Number of colleges with Computer labs access / total colleges. • Number of colleges with websites / total colleges. • Number of universities offering ICT courses / total number of universities. • Number of universities / Institutes with online courses / total number of universities. • Is there dedicated infrastructure for ICT? - Wireless networks - Optical Fibre Cable (OFC)/Networks - IT parks - State Wide Area Network (SWAN) - State Data Centers (SDCs) • Number of kiosks in rural areas per village • Average distance in kilometres from the nearest - Primary School - Post Office - Public Telephone booth - Computer Training Center - College - Internet Kiosk - Medical Store • Number of public access to the internet (cyber cafes registered)	• Average distance in kilometres from the nearest - Primary School - Post Office - Public Telephone booth - Computer Training Center - College - Internet Kiosk - Medical Store

Indicators for Readiness

Indicators	Sub-Indicators	Indicators of Significance
Individual Readiness	• Percent of total household with the following consumer goods - Television (TV) - Personal Computer (PC) - Telephone - Cellular Phone - Internet Connection - Cable Connection • Number of IT qualified teachers/total teachers. • Total number of Engineering students/total Technical students. • Total MCA Students/ total Technical students • Total BSc (Computer Science) students/total Technical students • Total Diploma in Computer Application students/total Technical students • Total 12th pass (computer science subjects) students/total Technical students • Literacy rate	• Total BSc (Computer Science) students/ total technical students • Total number of engineering students/total technical students. • Total MCA students/total technical students • Per cent of total household with the following consumer goods - Personal Computer (PC) - Telephone - Cellular Phone
Business Readiness	• Total number of IT parks. • Companies registered in IT parks per IT park • Total no. of employment in IT cos/total number of IT parks. • Number of registered training centres / '000 population. • ICT exports to total exports. • Number of ICT jobs to total jobs	• Total no. of employment in IT companies/total number of IT parks. • ICT exports to total Exports
Government Readiness	• Percentage of Government expenditure on - Primary Education - Secondary Education - Under Graduate Education • Does an intranet exist in government departments? • Total number of government websites. • Total number of websites in local language. • Do ERP/online Performance Evaluation System packages exist? • Does a PERT chart exist for new ventures? • Percentage of CICs set up by the Government • Percentage of CICs set up by Private sector • Number of CICs per village • How many ministries use ICT in governance process/ functioning process? • Percentage of internet connections - Dial up - Wide band-not dial-up upto 256 kbps - Broadband (registrations received by BSNL and MTNL, 2005) • Does a separate ministry exist for ICT? • Percentage of top officials trained in ICT/with access to computer training programme. • Number of govt officials with online training programme.	• Proportion of policies taken for ICT Readiness • Percentage of top officials with on-line training programmes • Percentage of government expenditure on secondary education • How many ministries use ICT in governance process/ functioning process?

Indicators for Usage

Indicators	Sub-Indicators	Indicators of Significance
Individual Usage	• Average household monthly expenditure on - Internet Access - Cell phone - Cable Connection - Telephone • Current year to year growth rate in the number of internet users in past 2 years • Per Capita Net State Domestic Product	• Average household monthly expenditure on - Internet Access - Cell phone - Telephone • Per Capita Net State Domestic Product
Business Usage	• Share of companies using - Lease Lines - ISDN - VSAT	• Share of companies using - VSAT - ISDN
Government Usage	• WLL phones in rural areas / total number of villages. • Application of ICT in Agriculture. • Application of ICT in Health services. • Application of ICT in Transportation. • Application of ICT in Energy. • Application of ICT in Trade. • Total number of e-governance projects undertaken. • Have government employee records been computerised? • Facilities available online: - Land records - Movable Property - Stamp paper registration - Utilities billing - Crime registration - Municipality administration - Birth & Death Certificates - Documentation of Policy • Government expenditure on IT/NSDP • Status of accessibility of the information and services by the citizen? • E-governance Training Programmes and Workshops per e-governance project • Number of Participants per e-governance workshop	• Status of accessibility of the information and services to the citizen • Proportion of policies taken for ICT Usage • Total number of e-governance projects undertaken.

Sources of Data for State Level Assessment

Indicators for Environment

Indicators	Sub-Indicators	Source
Market Environment	• ICT exports / total exports • *Competition in the ISP sector:* - Number of Players - Market share of lead players (in per cent) • *Competition in the cellular sector:* - Number of Players - Market share of lead players (in per cent) • *Competition in the Telecom sector:* - Number of Players - Market share of lead players (in per cent) - Range of price charged for internet connection (per 100 hours)	State Government
Political and Regulatory Environment	• Does IT policy exist? - When was the ICT Policy initiated? - How often is the ICT Policy revised? • Is there a section in the following sections: - Enabling Policy - Regulatory Policy - Legal Policy - Security Policy • Is there a Performance Matrix of the state for monitoring policies? • Is the issue of IPR addressed in the ICT policy? • Is there effective legal machinery to tackle the problem of piracy of ICT products? • Does a state level action plan exist? • State e-governance mission team (SeMT) been set up for e-governance projects? • Is there a transparent policy for public private partnerships (PPP) for e-governance activities? • Has the government given support to ICT in way of initiatives, priorities, policies and interests? • Time taken to get clearance for starting an ICT business • Does a supplementary budget exist for state level projects? • Has an e-governance committee been set up?	State Government

	• Is there a Mission/Objectives/Strategies and Tactics (MOST) document for e-governance? • Have you enacted the IT ACT 2000 which is applicable to all states? • Are there cyber laws that confer legal status to electronic transactions and documents? • Is there a law on regulation of digital signatures and encryption? • Have any concessions been given to industries/companies for ICT activities? • Are subsidised utilities provided to ICT firms? • Any sales tax concessions have been given to ICT companies? • Give the total number of complaints/cases registered relating to IPR • Number of initiatives taken for telecom regulation and ICT trade policy? • Are there any public private partnerships for development of ICT infrastructure?	
Infrastructure Environment	• Number of villages with VPTs / total villages. • Number of public pay telephones / '000 population.	Department of Telecommunications (DOT)
	• Waiting time for telephone lines (Number of days). • Total number of telephone mainlines / total population. • Total number of cellular connections /'00 fixed lines. • Number of schools with Internet access /total schools • Number of schools with Computer labs access /total schools. • Number of schools with websites / total schools. • Number of colleges with Internet access / total colleges. • Number of colleges with Computer labs access / total colleges. • Number of colleges with websites / total colleges. • Number of universities offering ICT courses / total number of universities. • Number of universities / Institutes with online courses /total number of universities. • Is there a dedicated infrastructure for ICT? - Wireless networks - Optical Fibre Cable (OFC)/Networks - IT parks - State Wide Area Network (SWAN) - State Data Centers (SDCs) • Number of kiosks in rural areas per village • Number of public access to the internet (cyber cafes registered)	State Government
	• Average distance in kilometres from the nearest - Primary School - Post Office - Public Telephone booth - Computer Training Center - College - Internet Kiosk - Medical Store	Market Information Survey of Households (MISH)

Indicators for Readiness

Indicators	Sub-Indicators	Source
Individual Readiness	• Percent of total household with the following consumer goods - Television (TV) - Personal Computer (PC) - Telephone - Cellular Phone - Internet Connection - Cable Connection	Market Information Survey of Households (MISH)
	• Number of IT qualified teachers / total teachers. • Total number of Engineering students / total Technical students. • Total MCA Students/ total Technical students • Total BSc (Computer Science) students/ total Technical students • Total Diploma in Computer Application students/ total Technical students • Total 12th pass (computer science subjects) students/ total Technical students	State Government
	• Literacy rate	Census of India, 2001
Business Readiness	• Total number of IT parks. • Companies registered in IT parks per IT park • Total number of employment in IT companies/total number of IT parks. • Number of registered training centres/'000 population. • ICT exports to total exports. • Number of ICT jobs to total jobs	State Government
Government Readiness	• Percentage of government expenditure on - Primary Education - Secondary Education - Under Graduate Education • Does an intranet exist in government departments? • Total number of government websites. • Total number of websites in local language. • Do ERP/online Performance Evaluation System packages exist? • Does a PERT chart exist for new ventures? • Percentage of CICs set up by the Government • Percentage of CICs set up by Private sector • Number of CICs per village • How many ministries use ICT in governance process/ functioning process? • Percentage of internet connections - Dial up - Wide band-not dial-up upto 256 kbps - Broadband (registrations received by BSNL and MTNL, 2005) • Does a separate ministry exist for ICT? • Percentage of top officials trained in ICT/with access to computer training programme. • Number of government officials with online training programme.	State Government

Indicators for Usage

Indicators	Sub-Indicators	Sources
Individual Usage	• Average household monthly expenditure on - Internet Access - Cell phone - Cable Connection - Telephone	Market Information Survey of Households (MISH)
	• Current year to year growth rate in the number of internet users in past 2 years	State Government
	• Per Capita Net State Domestic Product	Handbook of Statistics on Indian Economy, RBI
Business Usage	• Share of companies using - Lease Lines - ISDN - VSAT	State Government
Government Usage	• WLL phones in rural areas / total number of villages. • Application of ICT in Agriculture. • Application of ICT in Health services. • Application of ICT in Transportation. • Application of ICT in Energy. • Application of ICT in Trade. • Total number of e-governance projects undertaken. • Have government employee records been computerised? • Facilities available online: - Land records - Movable Property - Stamp paper registration - Utilities billing - Crime registration - Municipality administration - Birth & Death Certificates - Documentation of Policy • Government expenditure on IT/NSDP • Status of accessibility of the info & services by the citizen? • E-governance training progs and workshops per e-governance project • Number of participants per e-governance workshop	State Government

ANNEX V

E-Readiness: State-wise Status Chart

States	Environment	Readiness	Usage	E-Readiness Index Category
Andaman & Nicobar	L6	L6	L5	Least Achiever
Andhra Pradesh	L2	L1	L2	Leader
Arunachal Pradesh	L6	L6	L5	Least Achiever
Assam	L4	L4	L6	Below Average Achiever
Bihar	L5	L5	L6	Below Average Achiever
Chandigarh	L1	L2	L1	Leader
Chattisgarh	L3	L4	L3	Average Achiever
Dadra & Nagar Haveli	L6	L6	L6	Least Achiever
Daman & Diu	L6	L6	L5	Least Achiever
Delhi	L2	L3	L1	Aspiring Leader
Goa	L1	L4	L2	Aspiring Leader
Gujarat	L2	L4	L2	Aspiring Leader
Haryana	L2	L2	L1	Aspiring Leader
Himachal Pradesh	L3	L4	L3	Average Achiever
Jammu & Kashmir	L5	L4	L5	Below Average Achiever
Jharkhand	L4	L3	L4	Average Achiever
Karnataka	L2	L1	L1	Leader
Kerala	L2	L1	L1	Leader
Lakshadweep	L5	L2	L3	Below Average Achiever
Madhya Pradesh	L4	L2	L4	Average Achiever
Maharashtra	L1	L1	L2	Leader
Manipur	L6	L5	L6	Least Achiever
Meghalaya	L4	L5	L3	Below Average Achiever
Mizoram	L4	L5	L2	Below Average Achiever
Nagaland	L5	L6	L6	Least Achiever
Orissa	L4	L3	L4	Average Achiever
Pondicherry	L2	L4	L4	Expectant
Punjab	L1	L1	L2	Aspiring Leader
Rajasthan	L3	L3	L2	Expectant
Sikkim	L3	L5	L3	Average Achiever
Tamil Nadu	L1	L1	L1	Leader
Tripura	L6	L6	L6	Least Achiever
Uttar Pradesh	L2	L2	L3	Expectant
Uttaranchal	L3	L3	L3	Average Achiever
West Bengal	L3	L3	L2	Expectant

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[a] Department of City and Regional Planning, University of California Berkeley
[b] Department of Electrical Engineering and Computer Science, University of California Berkeley

List of Contributors

Department of Information Technology

1. **R. Chandrashekhar, Additional Secretary**
   Qualification: MSc.Chem.(IIT Bombay), MS Computer Science (Pennsylvania State University)
   Area of Interest: e-Governance and development of IT sector in the country
   email: asegov@mit.gov.in

2. **S. P. Singh, Senior Director**
   Qualification: B. Sc Engg. (Hons) in Electronics and Electrical Communications from Punjab Engg. College Chandigarh; M. Tech. (Systems and Management), IIT Delhi
   Area of Interest: e-Governance, Development of IT Industry and International Cooperation
   email: spsingh@mit.gov.in

3. **Vineeta Dixit, Senior Consultant (NeGP Programme Management Unit)**
   Qualification: MBA(Marketing) The Business School, Jammu University
   MSc. (Social Policy & Development), London School of Economics
   Area of Interest: e-Governance, ICT for Development and PPP in social sector
   email: vineeta@negp.gov.in

List of Contributors

National Council of Applied Economic Research (Core Group)

1. **Mr. R. Venkatesan, Senior Fellow, Team Leader and Main Author**
   Qualification: B. Tech (IIT- Madras), PGDM (IIM Bangalore)
   Areas of Interest: Managerial Finance, Privatisation, Industrial Economics, ICT- Industry Study, State level Development Plans
   email: r.venkatesan@vsnl.com; rvenkatesan@ncaer.org

2. **Dr. Wilima Wadhwa, Sr. Consultant, Jt. Team Leader and Co-Author**
   Qualification: Ph.D (University of California - Irvine)
   Areas of Interest:Developmental & Macro Economics and Econometrics
   e-mail:wilima@vsnl.com

3. **Prof. M.R. Saluja, Sr. Consultant**
   Qualification: M.A. (Mathematics). M Stat (ISI-Calcutta)
   Areas of Interest: Social Accounting Matrix and Database of Indian Economy, I-O Analysis
   email: mrsaluja@yahoo.com

4. **Ms. Rupa Malik, Research Analyst**
   Qualification: M.A. (Economics), Delhi School of Economics
   Areas of Interest: e-Governance, Developmental Economics
   email: rupamalik@gmail.com

5. **Mr. Bibek Ray Chaudhuri, Consultant**
   Qualification: M.Phil (Economics), Ph.D (submitted), JNU
   Areas of Interest: Productivity Analysis, Econometric Modeling and Development Economics
   email: brchaudhuri@iift.ac.in

6. **Ms. Kanika Kalra, Research Associate**
   Qualification: Masters in Transport Planning, Schoolo of Planning and Architecture
   Areas of Interest: Transport Economics
   email: kalrakanika@rediffmail.com

7. **Mr. Sujit Basu, Research Associate**
   Qualification: M.Phil (Economics), Jadavpur University, Kolkata
   Areas of Interest: Regional Economic Development
   email: sbasu@ncaer.org

NCAER
GOLDEN 1956 2006 JUBILEE

NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH

Parisila Bhawan 11 Indraprastha Estate New Delhi 110 002 India
T +91 11 2337 8263 / 2337 9861-63 F +91 11 2337 0164
W www.ncaer.org E infor@ncaer.org