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.

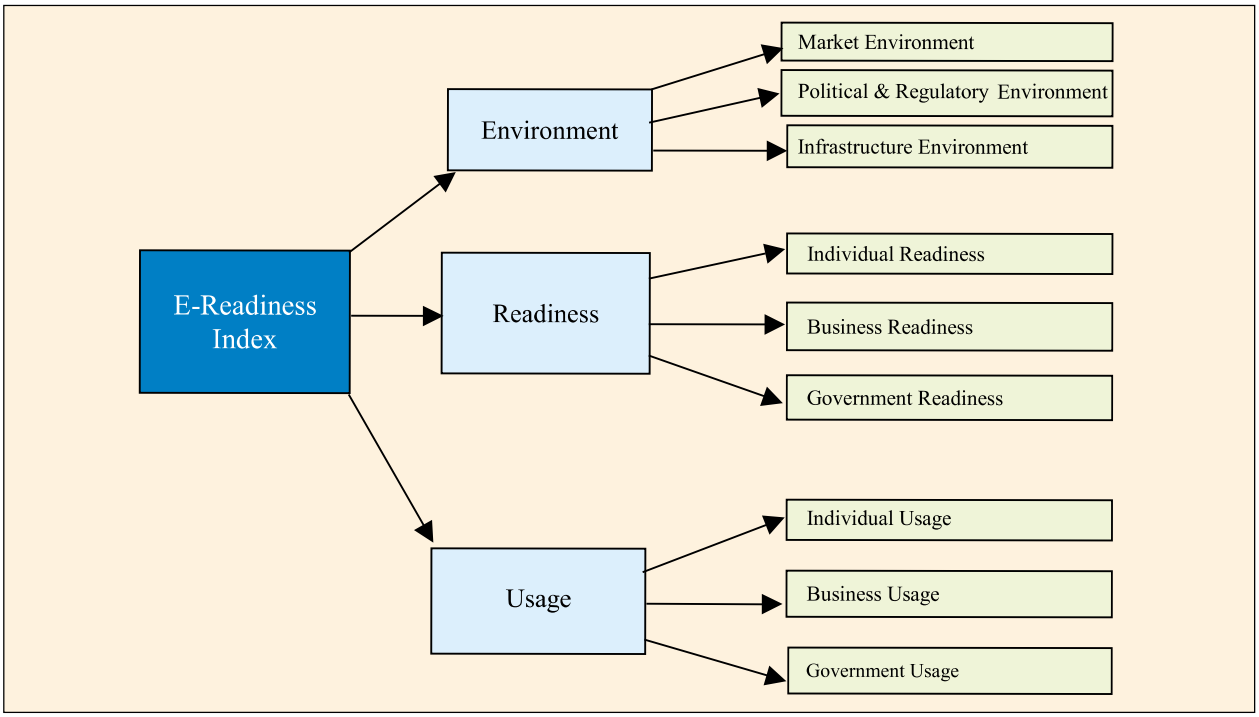
Identification of the levels of e-Readiness at the State level requires a three-step procedure.

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.

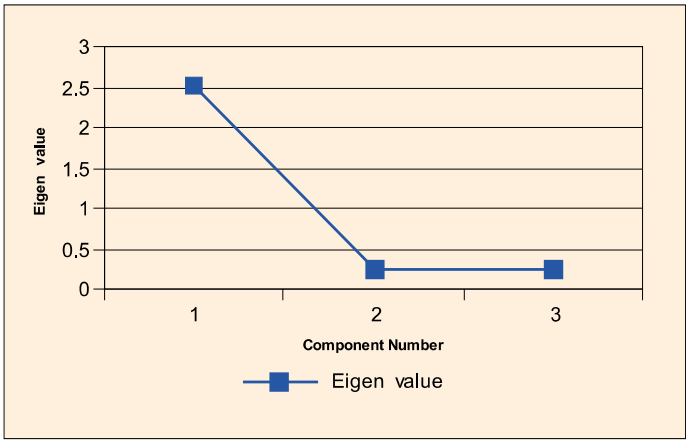
Table 2: The Weights of the Indicators for the Final Composite Index

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

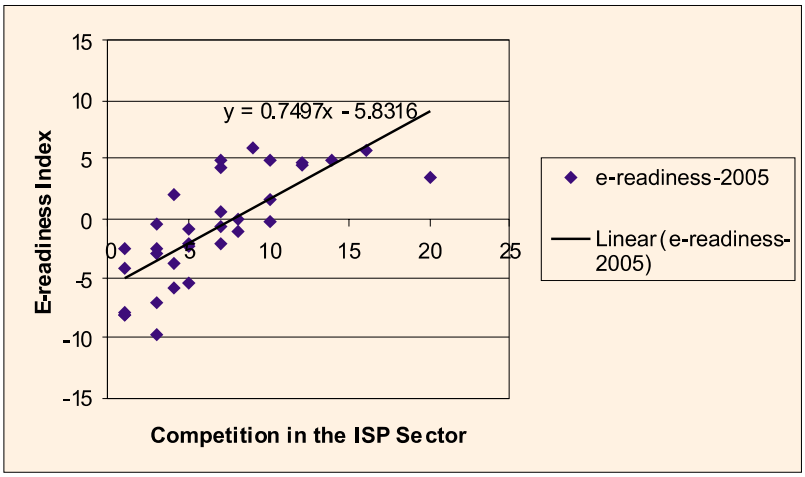
2.11 Relationship between Competition in the ISP Sector and e-Readiness Index.

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

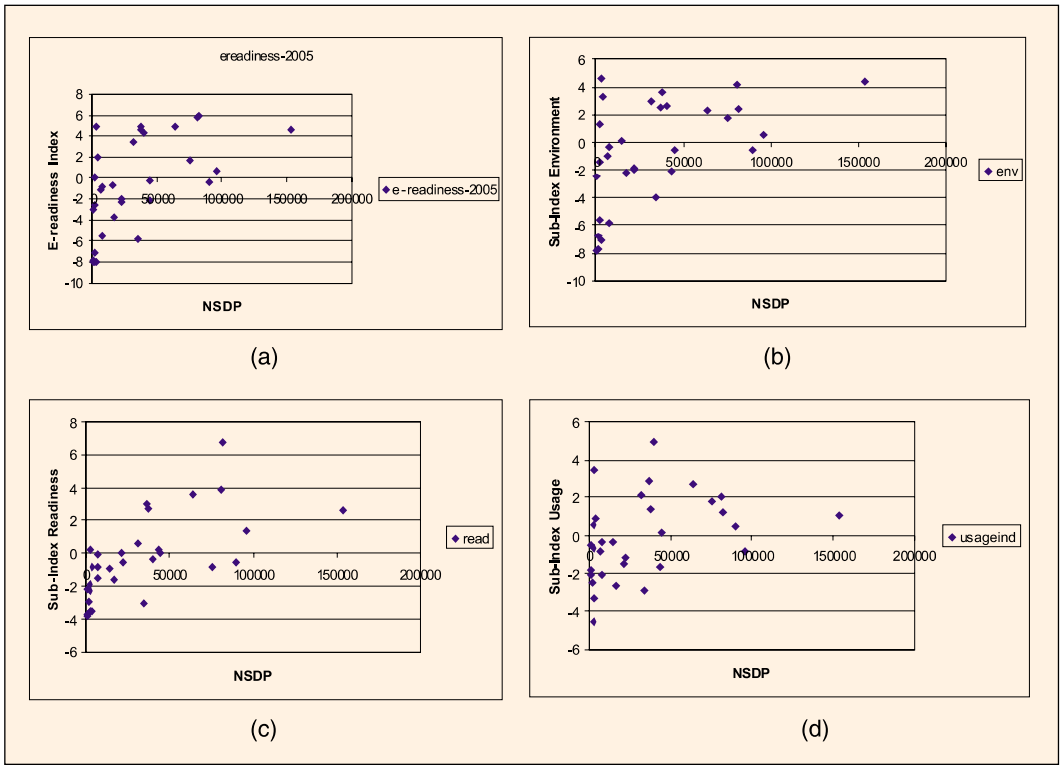
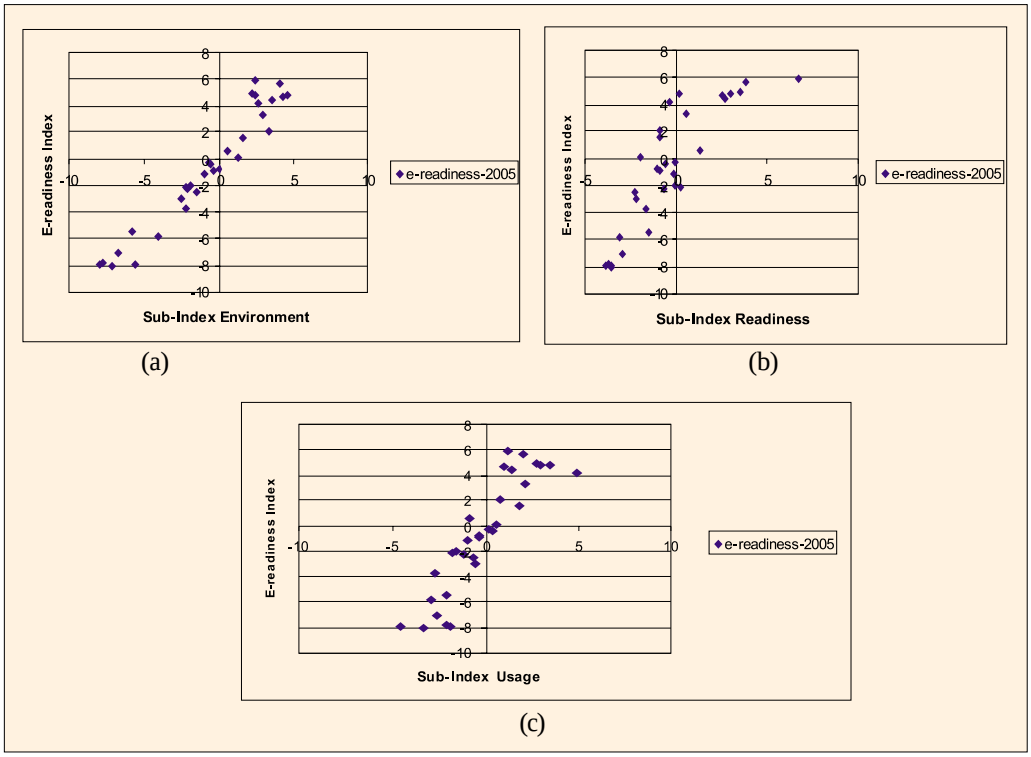


Figure 8: Scatter Plots Showing Relationships between Composite e-Readiness Index and the Sub-Indices



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

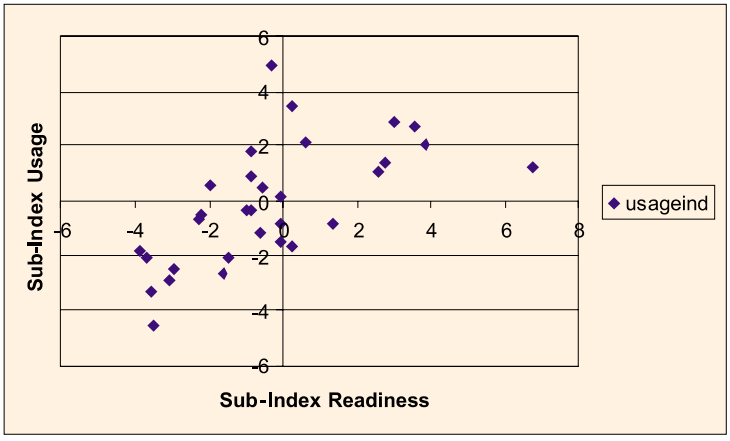
2.13 Relationship between Usage and Readiness

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