

Local Language Information Technology Market in India

Study Conducted by

Frost & Sullivan

for

MAIT- COILTech

Under the aegis of

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Table of Contents

Local Language Information Technology Market in India	i
A Report by MAIT and Frost & Sullivan	Error! Bookmark not defined.
May 2003	Error! Bookmark not defined.
Acknowledgements	iv
Executive Summary	1
Market Overview	1
Introduction	1
Summary of Major Findings	3
Market Growth, Opportunities, and Total Forecast	3
Benefits of Local Language Computing	4
Technology Trends	5
<i>Machine Translation</i>	5
<i>Optical Character Recognition (OCR)</i>	5
<i>Speech-to-Text and Text-to-Speech</i>	5
Competitive Analysis	8
Conclusions	9
Initiatives in Local Language Market	10
Need for Local Language Software	10
TDIL Initiative	10
C-DAC	14
Initiatives by Other Government Departments	14
Summary	15
Industry Challenges	17
Identification of Challenges Facing the Indian Local Language Software Market	17
Market Challenges	18
<i>Lack of Standards</i>	18
<i>Limited Availability of Software, Fonts</i>	19
<i>Low Availability of Local Language Content</i>	19
<i>Slow Technology Progress</i>	20
<i>Users Need for Evaluation and Certification</i>	20
Summary	20
Local Language Software Market-Vendor Analysis	21
Market Overview and Definitions	21
Market Engineering Measurement Analysis	21
Market Drivers	23
<i>Newer Areas of Application for Local Language IT</i>	23
<i>Government Initiatives</i>	23

<i>Bundling Of Multilingual Software</i>	24
<i>Advanced Research</i>	24
Market Restraints	25
<i>Lack of Formal Language-based IT Training</i>	25
<i>Limited Usage of the Available Local Language Applications</i>	25
<i>Lack of Spending</i>	26
<i>Low Connectivity</i>	27
Revenue Forecasts	28
<i>Demand Analysis</i>	29
Market and Technology Trends	33
Pricing Trends	34
Competitive Structure	35
Market Share Analysis	38
Product Analysis	39
<i>Machine Translation</i>	39
<i>Operating System</i>	40
<i>Human-machine Interface System</i>	41
<i>Speech Technology</i>	41
<i>Tools</i>	42
Summary	43
End User Sectors for Local Language Software Market	45
Market Overview and Definitions	45
Education	45
Publishing Sector	47
Small and Medium Enterprises	49
Banks	50
Health	52
Tourism	54
Summary	55
E-Governance Initiatives and Potential for Local Language Market	57
Background	57
Strategic Recommendations	61
Ecosystem	61
Vendors	61
Academia & Research	61
Government	62
Industries Association	62
Strategies of the Ecosystem	63
<i>Government</i>	63
<i>Vendors</i>	65

<i>Academia and Research</i>	67
<i>Industry Association</i>	69
Summary	69
Methodology for Research on Local Language IT Market	72
Research Methodology	72
Database of Key Industry Participants	76
Annexure: Questionnaire for IT Secretary and Local Language IT Vendor	78
Questionnaire for Local Language IT Vendors	78
Business Demographics:	78
Questionnaire for IT Secretary/Other Government official	84
Appendix	90
Maharashtra	90
Madhya Pradesh	92
Gujarat	93
West Bengal	95
Karnataka	96
Kerala	98
Uttar Pradesh	99
Rajasthan	100
Tamil Nadu	101
Andhra Pradesh	101
Punjab	102

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1

Executive Summary

Market Overview

Introduction

Historically, India has been a multilingual country. Today, the India Constitution officially recognizes 18 languages and ten different scripts used in different states / regions spread across the country. Despite the plurality of languages and scripts, the underlying grammar is largely similar across languages with a common vocabulary of 40 to 80 percent. An interesting point to note is that only 5 percent of the total population in the country can read or write in the English language.

It is evident that computer usage in India can only reach the masses if the human – computer interface is in Indian languages. Also, the success of any e-governance initiative would largely depend on the capability of the application to provide an interface to the end users in their native language. It is true that the penetration of personal computers and the usage of IT products and services in India are at a low level in comparison to other more developed countries. However, it is important to note that there has been no dearth of initiatives which have been undertaken by the government, various industry associations, research institutions, private firms, and even individuals. However, computer usage still seems to be a distant dream for the masses in India.

A close comparison of some statistics provides interesting insights:

- As per industry estimates, the contribution of IT to India's total GDP is 2 percent.
- PC penetration is at an appallingly low level of just 7.5 per 1,000 people.
- Internet penetration, which was expected to provide a fillip to PC penetration, has been able to reach just 1 percent of the total population (translating to about 10 million users).
- IT spending as a percentage of GDP today stands at 1.1 percent.

In contrast, in countries such as China, IT has a 7 percent share of the total GDP and PC penetration stands at 16 per 1,000 people. In Malaysia, IT contribution as percentage of total GDP stands at 5 percent and PC penetration is 69.4 per 1,000. Even in countries such as Thailand, PC penetration stands at 22 per 1,000 people.

However, one should not underestimate the efforts that the Government has taken to spread IT among the masses. As of now between Rs. 970 Crores to Rs. 1455 Crores have been spent in more than a 1,000 pilot projects. Although the success rate is estimated at around 40 percent, it still does not translate into widespread IT reach.

The private sector (including companies such as NIIT, Infosys, Wipro, TCS, etc.) has also invested in a number of pilot projects aimed at spreading IT among the masses. Corporate and Government Research Labs such as IBM India, Media Labs Asia, NCST (National Center for Software Technology), TDIL (Technology Development in Indian Languages), C-DAC (Center for Development in Advanced Computing), the Indian Institutes of Technology, and the NIIT-sponsored Centre for Research in Cognitive Systems, among others, have taken up numerous challenging projects. They have developed innovative products such as access devices, wireless technologies, machine translation, software applications such as text-to-speech and language recognition, among others. In addition, there have been several individual efforts like that of Prof. Jhunjhunwala from IIT Chennai and TeNeT, who have attempted to provide an affordable 'connectivity and access' solution for communication in rural India. Also, NGOs such as Development Alternatives, Inc. and VaanCha ICT have extended their support toward bridging the digital divide by taking computers and computer education to rural areas.

The following report provides the reader with a complete assessment and analysis of the local language application market in India. In this report, Frost & Sullivan has examined the different end-user segments within this market including solutions for the Central Government, different state governments and Public Sector Undertakings. The competitive landscape of the Indian market for local language applications is also discussed in detail and revenue forecasts are provided. In addition, drivers and restraints pertaining to the industry, market and technology trends, pricing issues, demand analysis and market share trends provide a comprehensive view of the entire market.

All revenues are presented in Rs. Crores. The report studies the local language application market in India over the period 1998 to 2005, with 2002 as the base year.

The products available in the local language computing market have been classified under the following categories:

- Machine translation
- Operating system and Middleware
- Human-machine interface system

- Software Tools

Summary of Major Findings

Market Growth, Opportunities, and Total Forecast

The total local language application market in India in 2002 was estimated at Rs. 53.55 Crores. The market is likely to grow at a CAGR of over 79 percent over the forecast period 2002-2005. By 2005 the revenues are likely to be about Rs. 310 Crores. During the period 1998-2002, the market was primarily driven by off-the-shelf applications for end users such as the publishing industry and government sectors. However, in the next two to three years the e-governance initiatives being taken by the various government bodies and Internet adoption is expected to spur the growth in the local language computing market in India.

In today's times, computing in India has essentially been the privilege of the English-speaking citizens. As evident from the print media and television, the potential for local content in terms of news, articles, views, weather, and health information and so on is immense. However, the applications provided and the local content available has to be rich enough to entice the end user. Multimedia-based content, user-friendly applications and wide adoption of Internet are expected to play a major role in spreading the usage and access of local language content.

The *top three drivers* of the local language application market will be:

- Introduction and promotion of new web based technology solutions and applications to cater to the growing needs of the end-users: citizens, business class and the government sector
- Increasing content creation in Indian languages for the web
- Initiatives in local language projects being undertaken by vendors, central and state governments
- Initiatives revolving around the commercialization of products and applications being developed in the numerous research labs in India.

The *top three restraints* for the local language software market will be:

- Lack of formal IT-based language training
- Lack of awareness regarding e-governance computing applications at the grassroots level and low PC penetration across the country. This is saddled with lack of insistence for seamless transaction support in Indian languages on web-based e-governance applications.
- Insufficient or delayed implementation of the initiatives taken by different government bodies

Benefits of Local Language Computing

The rapid developments in IT are widening the technology gap between the urban population and the rural populace. However, with the major cities getting increasingly saturated, the breed of local language solution providers is investing in various pilot projects to explore market opportunities among the rural masses. Technology support for Indian languages and the availability of applications that meet the requirements of the rural population is likely to decide whether information technology will be viewed by the villagers as an intrusion or as tool that can solve their day-to-day problems.

Some of the benefits that are expected to accrue as a result of widespread use of local language computing in India are:

- Since a vast proportion of the content on the internet is in English, many Indians are often unable to read the content and, hence, are excluded from the vast knowledge-sharing network. The use of local language applications is expected to eliminate these language barriers. Also, the increased use of existing web-based technologies is likely to make the content more easily accessible to the end users. The wide spread accessibility and availability of pertinent content would push forward the demand for local language applications. Access by itself would also lead to creation of new content and ideas, thus leading to enhancement of the knowledge pool.
- The vast majority of the Indian rural population consisting of traders will be able to transact business in real time and become aware of the latest market trends.
- By using local language tools and applications, migrant labourers and their families can communicate with each other irrespective of time and location.
- Until now, language constraints have ensured that the majority of the Indian population has been living in islands completely cut off from the rest of the world in terms of knowledge-sharing. Use of local language computing will ensure that the entire village or community stays in touch with the rest of the world and exchanges views and ideas.
- Having acquired the pre-requisite skill sets for computing, newly skilled individuals will be able to explore the next set of employment opportunities that open up for skilled workers.

Technology Trends

The Technology Development for Indian Languages (TDIL) resource centers (under the Ministry of Information Technology) across the country are making serious efforts to develop state-of-the-art products and solutions for processing information in Indian languages. The areas of focus are applications such as:

- Machine translation
- Optical character recognition (OCR)
- Speech-to-text and text-to-speech in Indian languages.

Machine Translation

The various resource centers are adopting multiple approaches to machine translation. Anglabharti and Anubharti are two machine translation systems that have been developed by IIT Kanpur. Similar initiatives such as Matra, Mantra, and Anuvadak have been developed by centers such as the National Centre for Software Technology (NCST) and C-DAC. The potential of these machine translation applications is immense in the country. However, in the absence of a dependable commercial product, the technology vacuum remains a key challenge. Machine translation has emerged as a critical technology that can translate thousands of verses of English into regional languages. Smooth communication between the Center and the states is vital for good governance. Machine translation offers a great solution to address this issue.

Optical Character Recognition (OCR)

The TDIL resource centers in India are developing OCR systems for Indian scripts. OCR systems are being developed for Devanagari, Bangla, Oriya, Telugu, Gurumukhi, Kannada, and Malayalam. However, output efficiency has not yet been tested for any of these OCRs. In e-governance projects where volumes are significantly higher, use of OCR technology is expected to make data and record keeping simpler.

Speech-to-Text and Text-to-Speech

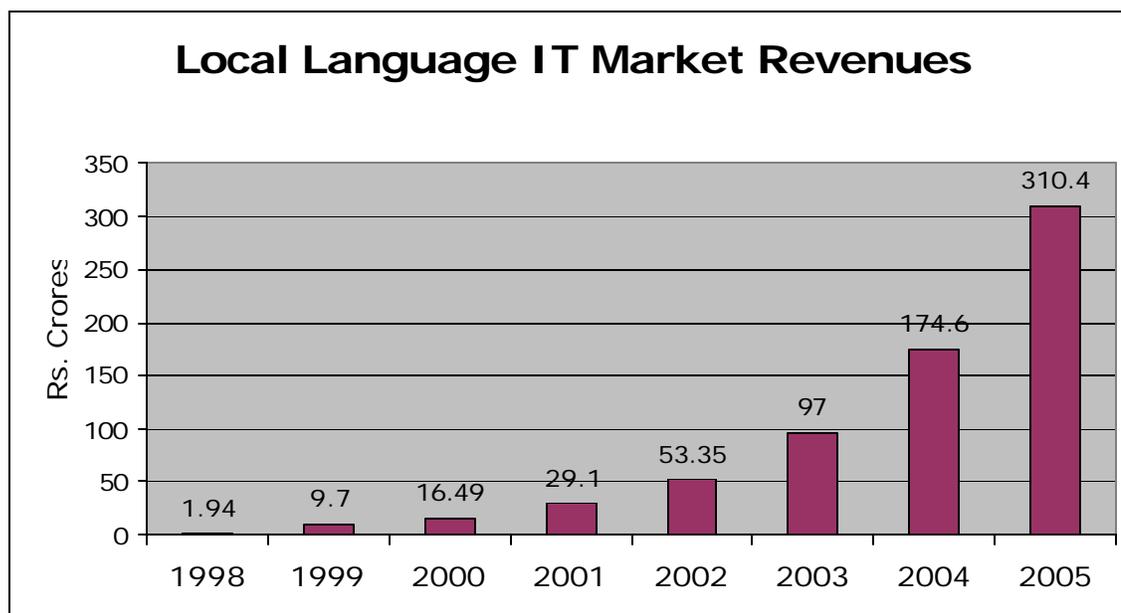
Text-to-speech (TTS) software converts written words into spoken ones. TTS is essential for large-scale applications such as e-mail reading, directory assistance and product information services. In the field of *text-to-speech* systems, pioneering efforts have been made by organizations such as the Tata Institute of Fundamental Research (TIFR), Central Electronics Engineering Research Institute (CEERI), Pilani, and The Center for Advanced Computing (C-DAC). However, a lot of work still

needs to be done as none of these technologies have been tested completely or turned into a product offering in the country. The technologies in *speech-to-text* systems are fewer and less mature. Both speech-to-text and text-to-speech systems need a greater impetus from research organizations to create efficient and viable product options for end users. Large-scale usage of text-to-speech software in the country is expected to enhance the speed of deployment by supplanting human recordings in a number of commercial applications.

Chart 1.1 shows the market revenues for the total local language software market from 1998 to 2005.

Chart 1.1

Local Language Software Market: Market Revenues in Rs. Crores (India), 1998-2005



Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

Figure 1.1 shows the revenue-split of off-the-shelf package sales by different product categories from 1998 to 2005.

Figure 1-1

Local Language Software Market: Revenues in Rs. Crores by Product Type (India), 1998-2005

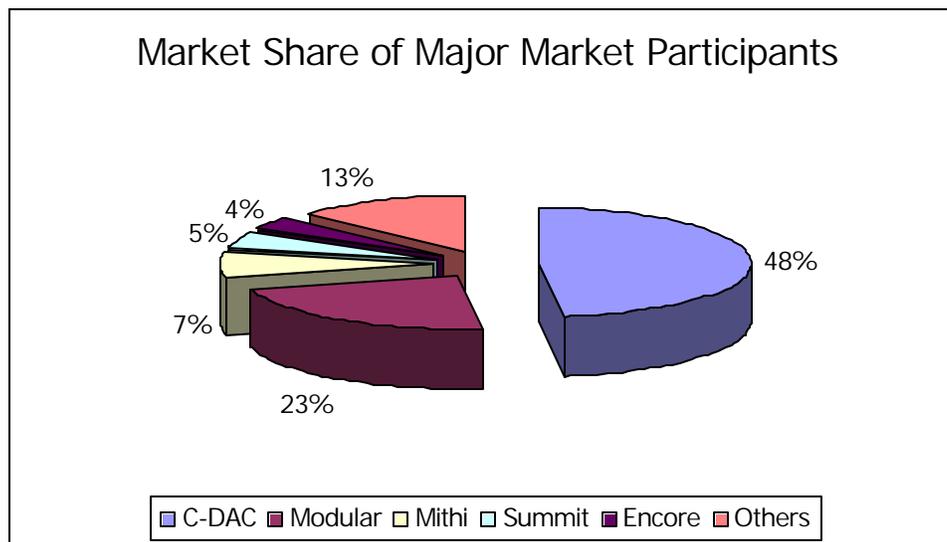
Year	Word Processing	Packages	DTP	Video
1998	1.4	0.2	0.4	-
1999	5.8	1.5	1.9	0.5
2000	8.2	3.3	3.3	1.6
2001	14.0	5.8	5.8	3.5
2002	25.6	10.7	9.6	7.5
2003	43.7	22.3	15.5	15.5
2004	78.6	43.7	21.0	31.4
2005	139.7	77.6	37.2	55.9

Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

Chart 1.2 shows the market shares of the significant vendors in the off-the-shelf local language market in 2002.

Chart 1.2

Local Language Software (off-the-shelf) Market: Company Market Share by Revenues (India), 2002



Note: All figures are rounded Source: Frost & Sullivan

Competitive Analysis

The prominent players in the local language software market in India are C-DAC, Modular, Mega Soft, IBM Research, Microsoft, Softek, Cyberspace, Encore Technologies, VSoft Technologies, Webdunia, Mithi Software, and Centre for Computer Education.

Companies such as IBM, Microsoft, Adobe, Quark, etc. have announced Indian-language equivalents of their popular software titles supporting documentation and workflow in the government processes. Various government-funded research institutes too are involved in developing local language support, technology, and applications. The local language computing software market has about 15 active vendors. Each of these vendors has multiple products in the area of word processing, communication software, data processing, speech technology and workflow, among others.

Technology Development for Indian Languages (TDIL) was initiated by the Ministry of Communications & Information Technology in 1991. As part of their local language initiatives, TDIL has set up 13 resource centers for developing technologies in various Indian languages and at the same time played a pivotal role in disseminating these technologies. Some of the key contributions of TDIL have been:

- Developing local language technology tools
- Promoting use of technology tools for language-based research and studies
- Consolidating technologies thus developed for launching innovative products and services

Conclusions

The report concludes that there is a huge untapped potential that needs to be explored by the government and the vendors to ensure successful use of local language computing applications.

The local language computing sector requires a boost to encourage the use of local language computing applications among the masses. Some of the projects initiated by the government have failed primarily due to the lack of commercialization of technology and lax timelines for projects. Moreover, the majority of the players in the sector are mid-sized companies or educational institutions with limited financial muscle; hence they often tend to be restrained in terms of their research and development (R&D) spending on new technologies. The key to success lies in reducing redundancies and enabling positive amalgamation of ideas and sharing of knowledge among government institutions, academia and vendors. A collective and combined approach is required to generate adequate content. Machine translation and creation of lexware, dictionaries, and WORDNET also need a collaborative approach that can lead to a faster development and intelligent computer learning of the language.

Both the central and the state governments need to encourage the use of local language applications in their departments. It is of equal importance to ensure that most of the software for workflow process and documentation systems is enabled in local languages. The government needs to ensure that all real-life applications step out of planning stage and get implemented at the respective departments, thereby providing relevant and real-time information in local languages to citizens of India. Popular web applications such as on-line train ticket booking should be made available to users in Indian languages to pull users. Ease of use will be a key differentiator for such departments. Internet is the one of the key driver for Local Language market.

In conclusion, this report provides market strategies based on the diffusion model for the local language IT ecosystem.

2

Initiatives in Local Language Market

Need for Local Language Software

A crucial challenge for India, a multilingual country, has been the need to strike a balance between language as an important element of cultural and social expression and its role as a medium of communication that binds the nation together. It is, therefore, logical to see why English and Hindi have emerged as languages that bind, even though the nation communicates in 1,650 dialects, and officially recognizes 18 languages and 10 scripts. English continues to be ubiquitous as a mode of communication in higher education, judiciary, bureaucracy, and the corporate sector. Yet, a mere 5 percent of the population speaks English as their first language and a marginally higher percentage is comfortable with it as the primary mode of communication. Against this, the 1991 census figures suggest that close to 40 percent of the Indian population speaks Hindi or one of its variants as their first language.

Technology is a known catalyst for operational efficiencies and a harbinger of heightened economic activity, both of which contribute to the betterment of a nation's human resources. However, effective citizen participation is directly correlated to the ease with which they can communicate with technology. Internet is expected to be a key route for achieving operational efficiencies. It is, therefore, rational to assume that IT tools that facilitate human-machine interaction in local languages are likely to drive a more vigorous citizen participation, which in effect should drive technology penetration among the masses and increase computer and Internet usage in India.

The Ministry of Communications and Information Technology, is attempting to bridge the digital divide in India by promoting the development of IT tools in local languages through initiatives such as The Technology Development for Indian Languages (TDIL).

TDIL Initiative

The Government of India launched the Technology Development of Indian Languages (TDIL) initiative in 1991. The objectives of this program broadly included:

1. The development of technology-based tools for Indian language processing

2. Facilitation of human-machine interaction in Indian languages
3. Promotion of R&D in information processing in Indian languages, and
4. Promotion of Information Technology and its tools for the study of various Indian languages

Prior to initiating the TDIL, the erstwhile Ministry of Information Technology (prior to its merger with the Ministry of Communication), sponsored programs such as the Technology Development Council (TDC) and Knowledge Based Computer Systems Development (KBCS).

Some of the identified thrust areas for TDIL and achievements are briefly discussed below:

■ Indian language resources: Corpora, lexical resources, dictionaries

A machine readable corpora of about 3 million words in Indian languages such as Assamese, Bengali, Hindi, Kannada, Kashmiri, Malayalam, Oriya, Punjabi, Sanskrit, Tamil, Telugu, and Urdu has already been developed; while work is in progress for Gujarati, Marathi, and Sindhi. Software was developed for the grammatical tagging of corpora, word count, and frequency count. The spell check function for some of these languages has also been developed.

■ Indian language processing systems, tools, and translation support systems

Multiple initiatives are happening on translation systems that translate Indian vernacular languages to the national language: Hindi. Anusaraka, a translation system for Kannada to Hindi has been demonstrated. Work is on for other translation pairs such as Bengali, Marathi, Punjabi, and Telugu to Hindi. A prototype machine-aided translation system for human translation of news stories from English to Hindi has also been developed. Some other successful forays into machine-aided translation systems include one for translating English text about public health to Hindi. It has been developed primarily for public health campaigns and is currently being installed at user sites for field testing. This will soon be extended to other knowledge areas/domains such as financial and supplementary rules of the Indian Government and related correspondence.

Cognition of the role of Sanskrit as a root language has lead to specific initiatives directed at natural language processing in Sanskrit. These are expected to have a positive fallout on other Indian languages. Some of these initiatives include semantic analysis of Sanskrit sentences through 'Shabdabodha', an application for development of modules that generate, analyze, and identify noun and verb forms using the rules available in Panini's grammar. The latter will find use in syntactic analysis of simple Sanskrit sentences. New projects include the development of a Sanskrit authoring system that will including a word processor.

■ Localization of software for Indian languages

The Indian Government has been working actively with local and international companies to localize operating systems (OS) and application software in Indian languages. In 1995, the then Department of Electronics (now Ministry of Information Technology and Communication) along with the

Government of India worked with Tata Information Systems Ltd and Aarkay Research Foundation to initiate a project for the development of a PC DOS that could support all internal and external commands in Hindi. More recently, the National Centre for Software Technology (NCST), an autonomous society under the purview of the Government of India, and Microsoft Corporation are working together to provide an OS level support that enables use of Indian languages in the Windows NT system. The collaboration will enable word processing, spread sheets, database management, and other office productivity tools to be supported on Windows NT in Hindi. Also in the market is a solution from Apple Computer that offers solutions for multilingual computing and provides an OS level support for multiple applications. This solution uses an Indian scripts code that has already been standardized in India for information interchange.

■ Human-Machine Interface Systems

Human-Machine Interface Systems aim to provide superior computer interaction through speech and vision. Globally, systems such as speech input/output and optical character recognition (OCR) are still in nascent stages of acceptance and their use has traditionally been restricted to selected specialized domains. In India, the current focus is on integrating OCR systems with text-to-speech synthesis. Efforts have been initiated toward the development of a spell checker and morphological processor in Bengali, with a speech output for the visually impaired. This will eventually be integrated with a word processor application.

■ Web centric applications, India Literacy Project tools and resources

Realizing the critical role of the Internet, developments in Indian language processing have been initiated to support usage of Indian languages on the Internet. These include development of tools and technologies to access the web, create content, and send and receive e-mail in Hindi. Proposed projects include the development of a pocket translator from foreign languages to Indian Languages to assist international tourists in communication and development of courseware for DOEACC 'O' level in print and electronic media.

■ Training programs for teachers/linguists

■ Natural language processing-teachers training program (NLP-TTP) courses have been initiated to train linguists and language teachers in the use of computers in Indian languages. At present, this program is active at seven centers across the country and has already trained 500 personnel. Initiatives have also been taken to introduce computer-aided learning and teaching (CALT) courses in the curriculum for graduate and post graduate students in education (B.Ed. and M.Ed. courses). Four resource centers have been identified for the introduction of CALT coursework; 215 students have enrolled in these programs, and 175 working teachers have been trained under the aegis of this program. Some projects directly contributed to development of authoring systems in Hindi and

Sanskrit, while the development of intelligent tutoring systems has helped in establishing the feasibility of computer-aided teaching/learning of Indian languages.

TDIL has established collaborations with 13 resource centers, which are located across the country at various educational institutions and R&D organizations. These are:

- Indian Institute of Technology, Kanpur
- Indian Institute of Technology, Mumbai
- Indian Institute of Technology, Guwahati
- Indian Institute of Science, Bangalore
- Indian Statistical Institute, Kolkata
- Jawaharlal Nehru University, New Delhi
- University of Hyderabad, Hyderabad
- Anna University, Chennai
- MS University, Vadodara
- Utkal University, Orissa, & Orissa Computer Application Centre (OCAC)
- Thapar Institute of Engineering & Tech., Patiala
- ER&DCI, Thiruvananthapuram
- C-DAC, Pune

The stated objective of these centers is to:

- To improve the quality of life of people in India by enabling use of Information Technology through Indian languages
- To develop new products and services for processing information in Indian languages
- To promote content creation efforts in Indian languages for better dissemination of information among the Indian masses, where Internet can be a key medium.
- To facilitate research in technology areas such as machine translation (MT), optical character recognition (OCR), text-to-speech (TTS), and speech recognition in Indian languages that lead to product development

C-DAC

In the early 1980s, the development of GIST (Graphics and Intelligence-based Script Technology) was a major break through and was started as a DoE sponsored project at the Indian Institute of Technology, Kanpur (IITK). Later the technology was transferred to the Center for Development of Advanced Computing (C-DAC), Pune. C-DAC has done a pioneering work in promoting IT applications for Indian languages. Codes for various keys used in Indian scripts and their layout have been standardized by the Bureau of Indian Standards. This development has led to a number of software products that are currently available in the market to enable diverse users to carry out word processing desk top publishing, spread sheet use, spell check and so on in DOS and Windows environments. Also, it is now possible to broadcast TV programs with dubbing and sub-titling in various Indian languages.

In addition to GIST, C-DAC has also brought out software called "LEAP" for Indian language word processing on Windows. A variety of fonts, called ISFOC fonts, for Indian languages have also been developed by C-DAC. These are currently being used for many desk top publishing applications.

Both NCST and C-DAC are pioneers in the areas of Indian language support on personal computers, and have developed software packages for transliteration. These packages are being used widely by Indian Railways (for display of reservation charts) and Mahanagar Telephone Nigam (for printing of bilingual telephone directories). Some renowned Indian universities are also using the software to print bilingual university degrees. Some States have used these technologies to computerize land records in Indian languages up to the district level. These States are also carrying out government related work in Indian languages using this software. Total solutions have also been created for the preparation of citizen ID cards in Indian Languages.

Initiatives by Other Government Departments

Other organizations both government and public/private, are also contributing to the effort toward bringing out software packages and tools for development of Hindi and other regional languages. Some of the notable efforts are listed below:

- Department of Official Language, Government of India, has initiated development projects with the help of C-DAC. These are in the areas of Computer-aided learning and teaching and computer-aided translation. In the area of learning and teaching, C-DAC has developed software in DOS and UNIX for teaching/learning Hindi to pass examinations such as Prabodh and Praveen conducted by the Hindi Prachaar Sabha.
- IIT Chennai has developed multilingual user interface software that can be used to prepare, view, and print documents in all Indian languages as well as some foreign ones. This software is a set of

application programming interfaces (APIs) for handling text strings in different languages. Each API consists of a set of C callable routines.

- Machine-aided translators for the domain of official language correspondence are available from B.M. Birla Science Centre, Hyderabad, for the translation of documents from Hindi to Telugu and English.
- Anusaraka technology aims at providing access to any other Indian language to a person who knows Hindi. This will be particularly important when content in Indian languages becomes available on the web or in digital form. It is jointly being developed by IITK and University of Hyderabad, Hyderabad. Angalabharati technology aims at machine-aided translation from English to Hindi for specific domains. It has been developed at IITK and adapted for the PC platform at ER&DCI, Noida. Machine-aided translation technology is also being developed at NCST, Mumbai, for translation of English news stories to Hindi and supporting these on the web.
- The Angalabharati approach developed at IITK on Sun Workstations is based on a pattern-directed, rule-based system, with a context-free grammar like structure for English. It generates a 'pseudo-target' applicable to a group of Indian languages to exploit structural similarities to obtain advantages similar to the Interlingua approach. The system attempts to integrate an example-based approach with a rule base and human-engineered post-editing. The Angalabharati technique has been ported to the PC platform under Linux environment by ER&DCI, Noida, and applied to develop a machine translation support system for translating public health campaign documents from English to Hindi.

To discuss the developments and exchange information among the R&D, industry, users, and government organizations in this area, the Department of Information Technology has been organizing an annual TDIL meet.

Summary

Only 3 percent of the Indian population can speak in English while close to 40 percent of the Indian population speaks Hindi or one of its variants. Still, the medium of communication in higher education, judiciary, bureaucracy, and the corporate sector is English. Since English is the medium of interaction in IT systems too, structurally, such a situation aggravates the divide between segments of population that have access to computing and the ones that don't. To arrest this situation, an important step has come from the Ministry of Communication and Information Technology in the form of The Technology Development for Indian Languages (TDIL). TDIL has been mandated to bridge the digital divide by developing IT tools in local languages in India.

Since 1991, TDIL has sponsored research in developing Indian language computing resources, processing systems, tools and translation support systems and localization of software for Indian languages. The other key initiatives have come in from development of Human-Machine Interface Systems and development of web centric applications.

TDIL operates on a distributed innovation model through collaborations with 13 resource centers across India. Some of the notable milestones have come through CDAC, a collaborative partner of TDIL in form of GIST (Graphics and Intelligence-based Script) that has brought diverse users to employ local language IT tools. Applications have ranged from desktop publishing to sub-titles in TV broadcast in various Indian languages. A Local Language word processor, 'LEAP' has brought desktop publishing to a large segment of population in a language they can communicate in naturally.

3

Industry Challenges

Identification of Challenges Facing the Indian Local Language Software Market

The first phase of the Frost & Sullivan Market Engineering methodology is to identify the key challenges facing the industry. These challenges have an impact on and are integrated into every phase of the market mapping in this study.

An industry challenge is an issue that can affect the development of the market or the competitors in the marketplace. Challenges include customer issues, regulatory programs, economic trends, market measurement trends, competitive strategies, new technologies, sales and marketing strategies, new market opportunities, and market threats.

Figure 3-1 lists the most challenging issues facing the Indian local language software market. These challenges have been identified based on the research done for this report. In the analysis of challenges to the industry, the timeframe is important. The timeframe analysis directly affects the market forecasts and the development of market strategies by industry participants.

This section provides a timeframe and assesses when each of the challenges is likely to have the greatest impact on the market over next 5-7 years.

Market Challenges

Figure 3-1 represents challenges for the Indian local language software market from 2003 to 2009

Figure 3-1

Local Language Software Market: Impact of Top Industry Challenges (India), 2003-2009

Challenge	1-2 Years	3-4 Years	5-7 Years
Lack of standards	High	Medium	Low
Limited availability of software, fonts	High	High	Medium
Low Availability of Local Language Content	High	Medium	Low
Slow technology progress	Medium	Medium	Low
Users Need for Evaluation and certification	High	Medium	Low

Source: Frost & Sullivan

Lack of Standards

There is an urgent need to popularize standards at the following levels:

- Script level
- Font level
- Access (indexing, sorting, and metadata)
- Input/keyboard standards
- Standardization of transliteration rules

Script and Font level information available in Vishwabharat magazines need to be widely popularized. Metadata and Access Standards available in TDIL magazines also require faster adoption by masses. These will form the rules for names and proper nouns for data processing and database creation. This allows creation of database in only one language (say English) but report generation and query evaluation in various Indian languages.

- Standardization of code for various applications such as graphics, natural language processing, string processing, and so on in Indian languages
- Standardization of cultural clip arts

This is essential when multilingual documents are prepared using Harvard Graphics, MS Office, and so on for representing cultural symbols.

Some standard drafts have been made and presented, such as the 8-bit ISCII or 16-bit Unicode for script standardization, ISFOC for fonts, and INSCRIPT phonetic keyboard layout. These have been presented and discussed at multiple levels in various meetings. However, the final standards have not yet been recommended.

In the absence of popular standards, vendors are developing solutions based on the proprietary technology. This is resulting in isolated solutions that are unable to share software, data, or fonts. Also, the proprietary nature of encoding ensures complete dependence on a single vendor for the next range of solutions; the scalability and flexibility of such solutions are unfavorably limited. Unicode consortium is working for a better solution and players like IBM, Red Hat, Microsoft, Oracle, Summit, Modular, and NCST are expected to soon reduce the barrier.

To remain in sync with the global developments on standards and to ensure building of world-class solutions in local languages, India has to actively participate in some of the international initiatives. India needs to be represented in global initiatives such as Text Encoding Initiative (TEI) and Open Language Archives Community (OLAC) to address its unique language requirements. Since every language is different with respect to its phonetic nature and glyph coding, it is important to ensure adequate representation for Indian languages in global initiatives. Ultimately, this will ensure availability of widespread global content in Indian languages and vice versa. Eventually, this will benefit the local language information-seeking citizens.

Limited Availability of Software, Fonts

The availability of software tools and re-usable components is limited. The products developed by TDIL, resource centers, and other funded agencies should necessarily be in the public domain. This will enhance shared learning, leading to additional software and faster development. The creation of reliable, re-usable, and interoperable content is a high-expense activity. The best international practices for data modeling and system design for Net-based collective work should be adopted. Tools and practices based on international standards will prove useful and provide the methodology for creating such content.

Open platforms and shared tools and environments are expected to spur faster growth in developing language technology. Some of the open domain content such as laws, regulations, statistics, and health-related information are possible relevant content. The oral heritage of the country along with the information available in national libraries and archives should be digitized adding to the relevant content, thereby, generating interest for accessing the same.

Low Availability of Local Language Content

Though efforts are on by the resource centers, few have completely accomplished high-quality machine translation. Numerous projects such as recognition of scripts, development of smart fonts, cross-lingual conversion utilities, multilingual search engines, and so on are being carried out to

ensure high-quality machine translation. Availability of inter-communication application for languages ensures translation of information available to the local language. This will ensure that the amount of content that can be accessed by an individual is far greater than that available in any one language.

Slow Technology Progress

Technological solutions such as Unicode and cross-Indian languages are being actively used in resource centers. However, further development carried out in these centers is more academic than commercial. Their efforts should be based on strong foundations and need be monitored constantly for progress evaluation and accreditation.

Consolidated efforts and a joint action by the public and private sectors is likely to ensure the right mix of intellectual, financial, and project management resources for rolling out commercial products within assigned timelines.

Users Need for Evaluation and Certification

Though a number of products and tools are available in the market, users are still confused about the various aspects of local language software. Issues such as interoperability, feature functionality, and after sales support are of paramount importance. These issues lead potential customers to picking pirated copies. The majority of end users are likely to shy away from investing in a product unless inconsistencies and compatibility issues are resolved. For this, an evaluation and certification authority might be required for technical and functional evaluation followed by certification.

Summary

While the eventual benefits of increasing access to local language IT resources to a large segment of the population is clear, there are multiple challenges that the fledgling Indian market will have to overcome before the avowed vision is taken to reality.

Some of the key challenges confronting the market at this point of time are:

- Lack of universal standards for scripts and fonts, input devices and transliteration
- Limited availability of software and fonts
- Low availability of local language content

4

Local Language Software Market-Vendor Analysis

Market Overview and Definitions

Local language computing is defined as the combination of hardware and software used to facilitate computing in local Indian languages. The local language initiatives have been led by and advanced with the launch of Technology Development for Indian Languages (TDIL) in 1991 under the Ministry of Communications & Information Technology in India. As part of TDIL initiatives, 13 resource centers have been set up across the country to develop technologies for providing solutions with the citizen interface (Internet medium) in select Indian languages. These solutions are then disseminated through state government, industry, NGOs and the academic agencies.

While the efforts of the government agencies are important in developing and promoting new technologies, the industry has also witnessed the emergence of key players and their distribution networks for propagating language-based solutions among various end-user segments. The key Vendors and the industry structure are discussed further in this chapter.

Market Engineering Measurement Analysis

Chart 4.1 shows the important Market Engineering measurements of the local language software market in India.

Chart 4.1

Local Language Software Market: Market Engineering Measurements (India), 2002

Measurement Name	Measurement	Trend
Market age	Development stage	
Revenues	Rs. 53.4 Crores	Increasing
Potential revenues (maximum future market size)	Rs. 310.4 Crores	Increasing
Base year market growth rate	83.0%	Increasing
Forecast period market growth rate	79.90%	Decreasing
Saturation (current/potential users)	17.18 %	-
Replacement rate (average period of unit replacement)	4 years	Steady
Average price	Rs. 9700	Decreasing
Price range	Rs. 4850-48500	Steady
Price sensitivity	High	Increasing
Total potential customers	More than 3 million	Increasing
Number of products	20	Increasing
Average product development time	More than 4 years	Steady
Product launches (number of new products introduced into market)	3	Increasing
Competitors (active market competitors in base year)	12	Increasing
Degree of competition	4	Increasing
Degree of technical change	High	Increasing

Source: Frost & Sullivan

Note:

1. Saturation: Frost & Sullivan defines Saturation as the ratio of current to potential sales at the terminal year of the revenue forecast
2. Degree of competition scale indicates the extent to which the market is competitive and is calculated on a 10 point scale. A rating of 10 indicates the market's are very competitive where as a score of 1 indicates that the markets are monopolistic.

Market Drivers

Figure 4-1 shows the important drivers favoring vendors in the local language software market in India.

Figure 4-1

Local Language Software Market: Market Drivers Ranked in Order of Impact (India), 2003-2009

Rank	Driver	1-2 Years	3-4 Years	5-7 Years
1	Newer areas of applications for Local Language IT	High	High	Medium
2	Government initiatives	High	High	Medium
3	Bundling of multi-lingual software	High	Medium	Low
4	Advanced research	High	Medium	Medium

Source: Frost & Sullivan

Newer Areas of Application for Local Language IT

While the benefits of the English based IT regime reached out to only a limited segment of the population, the benefits of local language will reach out to a larger mass of Indian population. Local Language IT will also spawn new set of economic activities that were hitherto not possible under the English language IT regime, bringing in the second wave of benefits.

Influence of Local Language IT has a potential to be effective in all facets of Indian life. From a farmer who has an opportunity based on local and neighboring mandi prices (made available by a public local language internet information kiosk) to a Tamil books publisher who finds greater efficiency in book publishing because of the usage of a local language based Desktop Publishing application, the applications will be numerous. The scale and intensity of benefits of the Local Language IT will drive large scale adoption of these systems.

Government Initiatives

Initiatives from the Government of India in this direction are expected to drive the market significantly. E-governance initiatives that make available Government services to citizens and businesses over the Internet will promote development of applications in bilingual form. To implement these initiatives, the government has allocated funds to the individual ministries, PSUs, and other departments. To further the cause, the government should make it mandatory for all its departments to develop multilingual applications. The e-governance initiatives in the various

departments should be benchmarked against successful implementations within and outside the country. Agencies should be appointed to monitor the progress of implementation and successful utilization of the funds earmarked for e-governance. The need today is for the government to seek private-sector participation in the e-governance and local language computing market. To further the development of technology in local language computing, the government should encourage R&D in the private sector. The onus is on the government, the IT Ministry, and TDIL to promote a level playing field for all solution providers—private or government-funded—in the local language computing space.

Bundling Of Multilingual Software

Bundling of multilingual software with hardware as a complete solution will probably drive the demand for local language computing. This is likely to assist in two ways. Firstly, the awareness of availability of multilingual software will increase and secondly, the barrier to the adoption of the local language software will be easier to overcome.

The multilingual software made available by ISPs for e-mail and web-based applications has also added to the increased use of language software as a browser and communication tool. The easy availability through free downloads of software and fonts from ISP portals is likely to provide the much-needed wide and free availability of software and, hence, help increased penetration of the software among the masses.

Advanced Research

Advanced research in technologies such as Optical Character Recognition (OCR), machine translation, speech-to-text, and text-to-speech is expected to provide much-needed impetus to the local language computing market. Components for delivering basic solutions should be set in place to better leverage advanced research. With the development of reliable OCRs, capturing data will be significantly easier. This is expected to be especially useful in applications requiring large databases. It will be useful if the manual records of a transaction-based government department need be converted to a database file, with maximum accuracy levels. Machine translation is expected to be useful for converting texts from one language to another. With the development of this technology, the knowledge on the World Wide Web can be channeled to local language users to provide access to all information available on the Net. Apart from this, multiple redundancies can be taken care of in many state and Central Government departments. Also, advanced research in speech-to-text and text-to-speech is likely to lead to the popularizing of the use of computers among the illiterate.

Market Restraints

Figure 4-2 shows the important restraints inhibiting vendors in the local language software market in India.

Figure 4.2

Local Language Software Market: Market Restraints Ranked in Order of Impact (India), 2003-2009

Rank	Restraint	1-2 Years	3-4 Years	5-7 Years
1	Lack of formal language-based IT training	High	High	Medium
2	Limited usage of available local language applications	High	Medium	Medium
3	Lack of spending	High	High	Medium
4	Low connectivity	High	High	High

Source: Frost & Sullivan

Lack of Formal Language-based IT Training

The lack of usage of local language-based IT products is accentuated by the fact that all the computer training institutes impart the training in English and not in the local language. It is a similar case with schools and colleges that impart computer training. The knowledge of parallel terminology is not common. Also, developing languages such as C+ and VB have no parallel teaching medium to English.

Before introducing any formal training in computers in the local language, a common vocabulary or glossary needs to be arrived at for various languages. The IT terminology needs to be standardized across Indian languages with the help of various experts and linguists. Most people that use computers get trained to use English-based software and are unwilling to shift to local language-based computing software.

Limited Usage of the Available Local Language Applications

Some of the off-the-shelf offerings in local languages are packages such word processor, office suites, accounting packages, and payroll packages. The rest of the local language initiatives are part of large e-governance projects. The e-governance projects are designed for specific interaction interface with citizens, such as for land records, income tax, and other applications. However, off-the-shelf packages targeting a common user have not had very widespread use. For example, payroll packages are

successful in factories where largely local language speaking laborers need to be notified or given pay slips. Packages such as word processor and accounting packages are used essentially by professional set-ups such as private clinics and private lawyer firms that need to send reports or documents in the local language to the local authorities. The usage is limited and given a choice, the professional firms would send the documents in English. Effectively, the usage of off-the-shelf packages, so far, has been more due to local policies in reporting and not due to popularity of the local language per se. Hence the actual usage of the local language off-the-shelf software is limited.

Lack of Spending

The working group on convergence and e-governance has earmarked an investment of Rs. 2706 Crores, of which Rs. 1847 Crores is for convergence and Rs. 855 Crores for e-governance, as part of the recommendations for the Tenth Five-Year Plan (2002-07). The large recommended outlays for IT clearly mark the recognition of IT by Indian Government as a socio-economic development tool. This is also in accordance with the worldwide acceptance of IT as a catalyst in development and the significant IT investments that governments the world over are making. The 1998 Task Force, set up to study the use of IT in governance, has suggested a number of key measures.

In 2000-01 alone, government expenditure on IT was Rs. 2700 Crores. In 2000-2001, only 3 percent of the total IT budget allocated to central and state government departments was utilized. Though the government is encouraging e-governance initiatives, the plans are disparate, leading to disorganized and non-integrated purchase.

An overview of e-governance shows that progress has been uneven, as there is lack of commitment to translate policy into reality. E-governance is widely varied in computerization rate and the actual use of IT-enabled applications within and outside the government. In spite of sustained efforts, the entire government machinery, especially in the states, is not available for computerization. Some state governments such as those of Andhra Pradesh, Karnataka, and Madhya Pradesh have made significant progress, whereas others have lagged for various reasons.

It is evident that most adopters are experiencing faster growth because of an early-mover advantage. Because of this disparity in adoption, a growing digital divide is observed not only between one region and another, but also between departments of the same government. Though an agenda has been devised to keep such records, there is no concrete data available on the level of IT deployment by various governments.

E-governance is likely to be a major driver with direct impact on the local language software market during the forecast period.

Low Connectivity

Connectivity is getting recognized as a means for empowerment and development. Most rural areas in India, however, remain unconnected. The need has been to provide connectivity to villages in India in a sustainable manner with minimal investment. The key has been low-cost wireless technology and Internet kiosks along the lines of public call offices (PCOs) and Cable TV operations in India. Rural areas in India are densely populated, with about 200 people per sq. km. In most places however, the affordability of a telecom line is still debatable. At the government level, almost 85 percent of the rural taluka headquarters in India already have fiber connectivity, and most villages are within 10 to 15 km of taluka headquarters. The key is to develop a system that is economically viable at 100 to 150 connections.

Another aspect that needs to be considered is that connectivity today should provide telephony as well as Internet services. A 33 kbps connection will enable videoconferencing, audio-conferencing, Net meeting, and live broadcast of lectures and training sessions. Without this, the connectivity is too poor to really become sustainable. Growth of applications, growth of e-governance, and hence applications of daily use, coupled with the fact that there is high population density, have the potential to prove connectivity solutions viable.

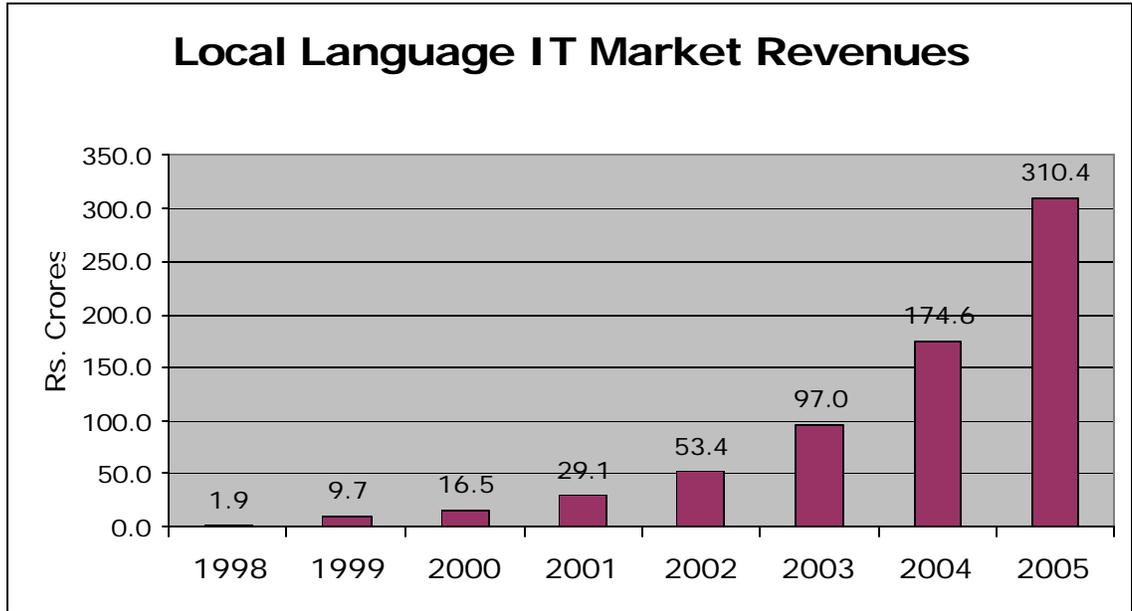
Midas Communication Technologies and n-Logue Communications Pvt. Ltd., along with IIT Chennai, have developed a corDECT Wireless in Local Loop (WLL) system that provides wireless telephony and Internet connectivity at a minimum rate of 35 kbps. CorDECT technology has taken between six and seven years to evolve and prove. However, this program has been limited to a few experimental areas only. It has not assumed a national scale as an affordable solution for connectivity.

Revenue Forecasts

Chart 4.2 shows the revenue forecasts for the local language software market in India

Local Language Software Market: Revenue Forecasts in Rs. Crores (India), 1998-2005

Chart 4.2



Source: Frost & Sullivan 2003

Figure 4-3 shows the Market Forecast for the Local Language IT Market in India

Local Language Software Market: Revenue in Rs. Crores Forecasts (India), 1998-2005

Year	Revenues (Rs. Crores)	Revenue Growth Rate (%)
1998	1.9	
1999	9.7	400
2000	16.5	70
2001	29.1	76
2002	53.4	83
2003	97.0	82
2004	174.6	80
2005	310.4	78

Compound Annual Growth Rate (2002-2005): 79.9 %

Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

The local language software market for 2002 was Rs. 53.4 Crores. The market witnessed a growth of 83 percent in 2002. The market is likely to grow at a CAGR of over 79.9 percent over the forecast period {2002-2005}. With the growth in e-governance initiatives, local language computing is likely to achieve a high growth. While over the past three years the market has been largely driven by off-the-shelf applications for end users such as publications and the government sector, the future growth in local language computing is likely to be closely correlated to the growth in e-governance applications developed for various government departments. A look at the Andhra Pradesh and Karnataka governments and their plans for e-governance provides an insight into how closely local language computing will be integrated into the overall scheme of computerization. This is especially true for the citizen interface services that these governments have initiated or planned.

Demand Analysis

The demand for local language computing applications and technology is expected to be driven by e-governance initiatives by the Central Government, various state governments, and the PSUs. Although most of the emphasis in e-governance has been around electronic services to citizens, state governments are also realizing that automating workflow for smoother internal operations reap the same kinds of benefits. Sharing relevant databases across departments to create seamless processes through technologies have enormous potential to reduce cost and improve services even if they are ultimately delivered to citizens using traditional methods. Such examples of potential e-governance applications are spelled out in Vision 2020 of the Government of Andhra Pradesh. The role of IT is

defined as that of a strategic tool in the socio-economic development of the state and IT is sought to transform the state into a knowledge-based society.

Apart from automating intra-government processes, the A.P. Government is developing citizen-centric services such as FAST (Fully Automated Services of Transport). This is a pilot project of the A.P. Government. FAST aims at providing services such as learner's licenses, driver's licenses, and registration of vehicles, (for non-transport vehicles) among other uses, by processing the application forms "live" through a comprehensive network of computers. All applications, government-to-citizen as well as government-to-government, have a local language interface to facilitate and encourage the use of the applications in the state.

The seamless integration of the solutions with that of other agencies will define the success and the ease of maintenance of the databases. Each of these solutions is unique and customized as per the process requirements. While some applications may be standard across the state departments, others may be offered as part of the specific state's initiatives. Such unique applications in the state are being developed with the help of leading consultants, solution architects, and system integrators.

While the consulting demand in local language is expected to be driven by e-governance, much of the off-the-shelf demand is expected to be driven by end users such as private enterprises, publication houses, small businesses, and factories. The demand for packages such as word processing and DTP packages has over the past three years grown due to the growth of the local language publishing sector. With the growth in demand books, newspapers, and magazines, the number of publishing houses and companies has grown. There are 6,830 English-language and nearly 40,000 local language newspapers in the country. Apart from these, publishing houses such as Children's Book Trust and Navneet Prakashan are also benefiting from the local language technology. The books can now be printed easily with the standard font types and compatible printing devices. With these advancements, the need for local language computing software is increasing.

Figure 4-4 shows the revenue split of off-the-shelf package sales by product.

Figure 4-4

Local Language Software Market: Revenues in Rs. Crores by Product Type (India), 1998-2005

Year	Word Processing	Packages	DTP	Video
1998	1.4	0.2	0.4	-
1999	5.8	1.5	1.9	0.5
2000	8.2	3.3	3.3	1.6
2001	14.0	5.8	5.8	3.5
2002	25.6	10.7	9.6	7.5
2003	43.7	22.3	15.5	15.5
2004	78.6	43.7	21.0	31.4
2005	139.7	77.6	37.2	55.9

Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

Factories and private enterprises also use local language applications. Some of the popular packages include accounting and payroll ones along with word processing software. Factories use the software for printing pay slips for the locally-hired working class and also for accounting purposes. The word processing software is also being used to prepare the necessary documentation in the local language for submission to the respective government offices at the district or taluka level.

The demand is likely to grow at a greater rate in consulting applications than in off-the-shelf applications. Figure 45 shows the split between the revenue by sales type of the local language software market.

Figure 4-5

Local Language Software Market: Revenues in Rs. Crores by Sales Type (India), 1998-2005

Year	Off-the-shelf	Consulting
1998	1.7	0.2
1999	7.9	1.8
2000	11.0	5.4
2001	17.2	11.9
2002	28.3	25.1
2003	45.6	51.4
2004	66.3	108.3
2005	102.4	208.0

Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

It is estimated that in 1999 about 81 percent of the revenues in local language computing software was from off-the-shelf packages. However, this ratio has steadily been changing in favor of consulting applications. In 2003 it is expected that 47 percent of revenues in local language computing will be from consulting applications. This is likely to further increase in favor of consulting solutions for local language applications. It is predicted that the consulting sales for local language computing will form about 67 percent of total revenues in the local language software market by 2005.

Figure 4-6 shows the percent of revenues by end users.

Figure 4 - 6

Local Language Market: Revenues in Rs. Crores by End User (India), 1998-2005

Year	E-governance	Publish	Enterprises/factories	SOHO	Multimedia	Others
1998	0.2	0.9	0.7	0.1.....	0.0	0.1
1999	1.5	4.1	2.4	0.6.....	0.4	0.8
2000	4.0	5.9	3.5	1.0.....	1.2	1.0
2001	9.6	9.3	5.2	1.5.....	2.0	1.5
2002	20.3	14.4	9.1	2.7.....	3.7	3.2
2003	41.7	23.3	13.6	3.9.....	7.8	6.8
2004	89.0	36.7	19.2	7.0.....	12.2	10.5
2005	180.0	55.9	34.1	9.3.....	18.6	12.4

Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

The contribution from the publishing industry and enterprises toward local language software revenues has decreased over the past three years. E-governance is expected to play a major role in the overall revenue growth rate of the local language software market. State governments have indicated higher spending budgets for e-governance, and local language support would be a major area invested in over the forecast period 2002 to 2005.

Market and Technology Trends

The local language computing software market is undergoing a great amount of technology churn. The resource centers are developing technologies in the area of machine translation as well as human-machine interface systems such as a speech-to-text-to-speech and OCR. These technologies are being developed in multiple Indian languages. With the commercialization of machine translation, a whole world of content can be opened to the non-English speaking population. Also, with the evolution in speech-text-speech, some of the problems of usage of computers among the population with low literacy skills can be addressed. Multimedia-based local language applications that are user friendly are gaining momentum and are being specially deployed in areas with low literacy rates.

The investment in generic software is expected to be based on the functionality that users get. However, increasingly more investment in this area in the future is going to be based on the kind of total environment that a company can offer, or the kind of services a partner can deliver, or the kind of solutions framework that an enterprise can use. An Indian language user is not likely to pay incremental amounts of money for disparate software created to address ad hoc requirements that does not do anything to deliver data sanctity. The accent in future is going to be on users getting more out

of their software. This is the focus that developing companies, system integrators, and vendor companies need to develop.

The sales in the local language computing software market are addressed both directly and indirectly. In terms of indirect sales, most of the distributors and resellers are not focused on local language software only. The software distributor, as part of distribution network typically also handles hardware, software, and networking products. This lack of focus can largely be attributed to a low and dispersed demand for local language software. The typical demand of a reseller in a city such as Nasik averages at a low of around 150 licenses of local language software per year. The market is not promoted by local vendors through any marketing campaign or by any other means. This can be attributed to the low financial muscle of the vendors. Given these factors, the market is sustained primarily due to word -of-mouth promotion.

The Internet has also increasingly become a distribution medium for local language software. Some of the vendors have tie-ups with ISPs for free demo downloads, limited version editions, and free fonts. However, this is likely to be a limited revenue stream for local language software vendors.

Pricing Trends

The average price of the off-the-shelf products is Rs. 9700. The range of products includes spell checkers, word processors, and accounting packages. The price range, hence, varies from Rs. 4850 to Rs. 48500. The average price is likely to decrease over the forecast period with the increase in volumes. It is likely that the average price will decrease to Rs. 5920 in 2005.

Competitive Structure

Figure 4-7 shows the competitive structure in the local language software market.

Figure 4-7

Local Language Software Market: Competitive Structure (India), 2002

Number of Companies in the Market	12-14 active players in the local language software market
Types of Competitors	Local language software vendors System integrators Consultants
Distribution Structure	Local language software is distributed directly and indirectly. Direct distribution and implementation is through <ul style="list-style-type: none"> ■ Language software vendor ■ Consultant and language software vendor Indirectly local language software is distributed through the following distribution channels: <ul style="list-style-type: none"> ■ Value added Resellers ■ Hardware /PC sellers ■ Systems Integrators ■ Consultants
Tiers of Competition	Three tiers of competition exist <ul style="list-style-type: none"> ■ Indian private software vendors ■ Indian government owned software vendors ■ Multinational software vendors
Key End-User Groups	Government offices E-governance projects Banking and insurance Publishing sector Multimedia and entertainment sector Individuals Small and medium enterprises Factories
Competitive Factors	Managing complex products or long lead time for sale Strong distribution network for reaching mass market for off-the-shelf products Adoption of standards such as ISCII and Unicode

Application characteristics in terms of feature-functionality, scalability, ease of customization, and background of the vendor

Source: Frost & Sullivan

There are about 12 to 14 vendors in the local language computing software market. Most of the domestic players are regional and limited in their access to the market. Apart from an array of domestic players, the local language computing market also has some international players with local solutions. Most of the domestic players offer both off-the-shelf products and consulting applications in all the major Indian languages. However, the international vendors are limited in their offerings in multiple languages. For example IBM offers a Hindi version of Lotus Notes in India. For any vendor to operate in the e-governance space in India, language-enablement of its respective IT products is becoming a precondition to build meaningful solutions with a local interface.

The vendors approach the end user directly or through channel partners/distributors. Most of the low-priced off-the-shelf packages of the domestic vendors are pushed through the distribution channel. A domestic vendor such as CDAC has a distribution network of about 45 resellers/distributors across the country. However, the distribution network is also shared by other companies such as Modular and Mithi. Most of the distributors keep multiple language software products to offer the most suitable product to the end user.

The vendors adopt a consultative approach for the e-governance solutions, which is the high-margin revenue stream. Some vendors such as CDAC are the preferred vendors for a large number of e-governance related computing software. Also, the vendors operate through a network of large implementation partners and consultants such as IBM Business Consulting Services (earlier PwCC), and Ernst & Young, which enables them to secure the local language computing part of the large e-governance projects. Also, this arrangement maximizes the reach of local domestic vendors by partnering with implementation partners having a national presence. Also, since these implementation partners that are usually system integrators or consulting companies, have been present in the country for a longer period, the vendors enjoy an established base with a high credibility.

The implementation partner relations are, however, not exclusive in the Indian local language software market. The suitability of the application in terms of feature-functionality, scalability, ease of customization, and background of the vendor are some of the key decision criteria when vendors partner with large companies for e-governance projects.

While there are a number of upcoming e-governance projects, the lead time between the initial requirement definition and the final go-ahead is long, leading to a long and uncertain sales cycle in direct consultative sales.

Most of the vendors in local language computing software are small sized and the revenues largely depend on the sales of language software. To combat the effect of a long sales cycle, where the margins may be high but uncertain, it is recommended that the strategies such as indirect sales be

used. It is necessary for the smaller companies to strengthen their distribution network across the country for the small to mid-sized enterprise (SME) markets that are largely untapped. With the increasing penetration in smaller towns and cities, it is likely that the revenues will keep flowing from the indirect sale segment as well.

International vendors such as Microsoft and IBM have their products comprehensively enabled for nine Indian languages. These products which include Windows XP, Office XP, Proofing Tools, SPS, SQL, Exchange, and Access, Lotus, IBM UDB DB2, Websphere Application Server among others can now combine to offer any kind of Indian language solution to the user. Indian vendors such as C-DAC and Modular have multiple-feature functionality products in the area of word processing, office suites, accounting, inventory and payroll packages, and communication applications including browser and tools for development. The products by Indian vendors are supplied in 16 Indian languages.

While the competition is likely to be stiff over the next few years, the key differentiating factors that are likely to be decisive for choosing one vendor over another include:

- Adoption of standards such as ISCII (Indian Script Code for Information Interchange) and Unicode.
- Core and integrated support from OS upward (Middleware)
- Open type
- Functionality and scalability
- Extensible support to bind different components together as the user requirements grow

Market Share Analysis

Figure 48 shows the market shares of the significant vendors in the off-the-shelf local language market.

Figure 4 - 8

Local Language Software (Off-the-shelf) Market: Company Market Share by Revenues (India), 2002

Company	2002 (%)
C-DAC	48
Modular	23
Mithi	7
Summit	5
Encore	4
Others	13

Others include Webduniya, Cyberspace, ABM and so on

Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

The market is dominated by C-DAC with about 48 percent of market revenues. The distribution reach of C-DAC, apart from the significant volumes from the government sector, is the prime reason for the market dominance. Modular is the second leading player with 23 percent share in revenues of the off-the-shelf local language software market.

In the consulting part of the local language market, the significant players are C-DAC, NIC, and other government agencies. The consulting share of the local language market varies with each project. E-governance projects are few, though they are significant in terms of project volume. Each of these projects makes a significant impact on market shares of the players. This has to be noted when assessing the market shares of the consulting projects. C-DAC is the leader in providing consulting local language solutions, followed by other solution providers such as NIC and Modular.

The market is likely to witness tectonic shifts in market shares in the years ahead because of the change in fundamentals. The current market is characterized by point applications that meet a limited need of integration and scalability aspects of the enterprises and e-government initiatives. As Governments start implementing sophisticated enterprise class applications, the distinguishing criterion for the choice of the applications will change from pure local language functionality to entire architecture of the solution itself and that is where vendors who have a complete end to end vision of enterprise class applications will win the revenue basket and market shares. Vendors such as IBM and Microsoft have the fundamental armory of products and solutions that can be customized to provide

the Local Language front end and we foresee them to be the challengers to the incumbents in the years to come.

Product Analysis

The products available in the local language computing market are segmented as:

- Machine translation
- Operating system
- Human-machine interface system
- Tools

Machine Translation

Machine translation appears to be one of the most widely pursued projects, which is justifiable considering the wide range of users of the end product. Many researchers throughout India have been investing a lot of time and effort to make their dream projects a reality.

Some of the prominent efforts and initiatives in this context are by the following resource centers of TDIL:

- Matra by NCST
- Anusaaraka by IIT Hyderabad
- Anubaad
- Mantra by C-DAC
- UNLP-based approach by IIT Mumbai
- Assamese-English by IIT Guwahati
- Anglabharati approach by IIT Kanpur and ER & DCI

Though the final aim of all these products is transliteration, there are some differences between the approaches followed by each, as well as in the final outcome.

UNLP Approach

IIT Mumbai has used the UNL (Universal Natural Language) approach for translation, in which data from one language is converted into a universal code, common for all languages, after which it can be

transformed to any other language of one's choice. So the concept is to break each language into the intermediate code, which is a central repository. A separate database of each Indian language is then required for further processing. Work at IIT, Mumbai, is primarily on Hindi and Marathi.

MaTra

MaTra is the result of an effort taken by the Natural Language Group of the KBCS (Knowledge based Computer System), division at NCST (National Centre for Software Technology), which they describe as a human-aided translation system for translating from English to Hindi. The idea is to break English sentences into pieces, and run them through an intelligent application, to determine the flow and structure of the sentences, which the user at this stage is required to confirm. On the basis of this interaction expected from the user, there are two versions of MaTra: MaTra Lite—fully automatic online translator, a simple web-based interface, and MaTra Pro—professional translator's tool with auto, semi-auto, and manual modes, GUI (Graphical User Interface), and a customizable lexicon. At present, it supports NCST's format and Unicode. It can be made to support ISCII also. The project was started with the aim of catering to the area of news, but is expected to serve other domains as well.

Anglabharati

This approach at machine translation is adopted and developed by IIT Kanpur, which is another TDIL resource centre. The system is very parallel to the UNLP method. English is first converted to an intermediate form called pseudo code, which can further be converted to any Indian language. The system is aimed at serving 18 Indian languages. A dictionary containing 20,000 words concerning the health and IT fields has been integrated into this system. User-friendly pre-processor and post-editing modules are some other noteworthy features. The Anglabharati software that has been developed using the ISCII code, now has the capability to work on a PC with the SUN system as well as the Linux OS.

Mantra

Mantra (MAchiNe assisted TRAnslation tool) translates English text into Hindi in the field of personnel administration, specifically gazette notifications, office orders, office memorandums, and circulars. Here the method used is to translate from one lexical tree to another. Mantra uses the ISCII code and a Lexicalized Tree Adjoining Grammar (LTAG) formalism to represent English as well as Hindi grammar.

Operating System

IndiX : Localisation of Graphical User Interface of Linux Operating System

This is a Linux operating system with a graphical user interface in Indian languages. Some typical system characteristics are the inclusion of Indic script shaping engine and open type font support. While the system essentially works with Unicode, which provides it portability, backward

compatibility is provided through UTF-8 encoding. The system is open to Indian scripts other than Devanagari.

Human-machine Interface System

The OCR technology is included among the core focuses of various research centers throughout India, working on a variety of languages. The system requires the help of a scanning device. The scanned data is converted into text form that can then be processed by any standard text editor. Most of these languages are developed in a 'C' programming language, which is platform independent. This enables the technology to work on any platform, be it Windows, Sun, or Linux. Each of these systems is coded in the ISCII (Indian Standard Code for Information Interchange), ISFOC (Indian Script Font Code), or the Unicode format. When integrated with a Hindi speech synthesis system, it can form a Hindi text-to-speech system. It can also function as an input for a machine translation system. Various organizations are working toward building a text to-speech-system for Indian languages.

The principal beneficiaries of these developments include newspapers in local languages, blind people, offices looking forward to office automation, publishers, for corpus (or content) generation in local languages, digital libraries, and others.

Institutes such as the Indian Institute of Technology (IIT), Kanpur, Indian Statistical Institute (ISI), Kolkata, and the Centre for Development of Advance Computing (C-DAC) have produced an OCR system for Devanagari. C-DAC, Pune, has signed a MoU with ISI to use its technology.

C-DAC and ISI have also developed a system for Bangla, and again a MoU has been signed between the two.

Work on an OCR system for Oriya has begun at ISI, Kolkata, and at Utkal University, Bhubaneswar. Hexacell Pvt. Ltd. & Webdunia have signed a user tie-up with Utkal University. Thapar Institute of Engineering & Technology, Patiala, has brought out an optical character recognition system for Gurmukhi. Another OCR system for Telugu is a product of the University of Hyderabad, which has a tie-up with Shri Veda Bharti, Hyderabad. Indian Institute of Science, Bangalore, was instrumental in the production of the OCR system for Tamil.

Speech Technology

Speech technology is another burgeoning area of interest among various organizations that foresee that the technology will cater to a wide variety of applications. This again could be broadly divided into text -to-speech and speech-to-text.

Text-to-speech

C-DAC, Pune, Tata Institute of Fundamental Research (TIFR), Mumbai, and Central Electronics Engineering Research Institute (CEERI), New Delhi, have created text -to-speech synthesis systems for

Hindi. CEERI, Delhi, has a tie-up with C-DAC for the same, while TIFR is conducting negotiations with Tata Infotech Ltd.

Indian Statistical Institute, Kolkata has brought out a similar system for Bangla, while work is in progress for a Tamil system at Anna University, Chennai, which has a tie-up with M/S Chennai Kavagil, at Chennai.

Speech-to-text

Various institutes have shown active interest in speech-to-text technology as well. A speech recognition system for Oriya has been developed at Utkal University, Bhubaneswar, and the Telephony Speech Recognition Software and Hindi Speech Recognition System by IBM India Research Lab are examples of developments in this area. Hexacell Pvt. Ltd. has a tie-up with Utkal University for this technology.

Research is in progress at Tata Infotech Ltd. to develop speech recognition and speaker verification systems.

A prototype product that is a Linux-based system on a hand-held device like a computer, called 'Limited Domain Speech Synthesis System for Tourists' has been developed at the International Institute of Information Technology at Hyderabad. The system converts English input to Telugu, and is expected to assist the non-Telugu speaking tourists to communicate with the local people.

Tools

Some of the significant tools developed in the local language computing market include the following.

Item- Indian Script Terminal for UNIX X-windows is a product developed at the Indian Institute of Technology, Kanpur, under Prof. Rajat Moona. It is a software tool to edit text-based utilities in a UNIX environment with local language support. The technology supports ISCII files, Inscript keyboard layout, and Devanagri TeX fonts.

Lekhan Patra - Bilingual Word Processor for LINUX is another product in this category developed by erstwhile Electronics Research & Development Centre at Noida that has now been merged with C-DAC.

Lekhika is a software tool with multilingual support, with capability to work with various fonts and file formats. This system also works with ISCII and Unicode codes, with the ability to be integrated with any platform, be it Linux, UNIX, or Windows.

C-DAC's Linux ISFOC Script Manager (LISM) is a software tool for word processing and editing in Indian languages on Linux-based systems. Apart from allowing support for ten Indian scripts and being able to work in multiple documents simultaneously, it also has the potential to process two

scripts concurrently. Presently, LISM supports Inscript Keyboard layout and the 8-bit Indian Standard Code for Information Interchange (ISCII).and the Indian Script Font Code (ISFOC).

The bilingual Punjabi-English word processor with spell checker was developed at the Thapar Institute of Engineering & Technology, Patiala. The product supports both phonetic and typewriter keyboard layout for Punjabi with an extra feature in the form of a spell checker to function on text in both Punjabi and English. The output is coded in ASCII format and the system works on any Windows platform.

Summit Information Technologies Pvt. Ltd has come up with Indica Multilingual Solution software development kit (SDK), a tool that supports Unicode format for all Windows platforms. It also allows the use of Oracle 8i/9i, MS SQL, 2000 server, and MS-Access. Various development platforms such as D2K, VB, ASP, JSP, Java, and HTML are supported. UNIX, Linux, RISC or CISC, and NT/2000 servers can be used with this system, which codes in Unicode or ISCII format and works in both client server and web environment.

A wide range of software tools with multilingual support has entered the market. These tools are word processors and text editors with Indian language support. Some of them hold additional features such as spell checkers, and dictionaries. Most of these tools use ISCII, ISFOC, or Unicode coding schemes, and can be installed on most platforms.

Summary

The Local Language IT market is in a development stage and the market is expected to grow at a healthy rate of 80 percent (CAGR) from Rs. 53.4 Crores in 2002 to Rs. 310.4 Crores in 2005.

The key drivers that will drive exponential growth for this market will be

- Newer areas of application for Local language IT in specific domains
- Broad based e-Governance initiatives that will employ local language as a front end to disseminate Government services to citizens and
- Bundling of multi-lingual software with PC's and other access devices

The market for Local Language IT is also likely to face a number of restraints that could inhibit the pace of adoption. They are:

- Lack of formal language-based IT training
- Limited usage of available local language applications
- Lack of spending
- Low connectivity

The Local Language IT market constitutes predominantly of word processing. Word Processing applications revenues in 2002 constituted 48 percent of the total market, with Packages and DTP constituting 20 percent and 18 percent respectively. While word processing software will continue to occupy a lion's share of the total revenues by 2005, package applications and local language multimedia and video applications are likely to grow at a significant pace.

Reflecting the diverse application areas that local language IT will be used across in the future, consulting services revenues are expected to see a big jump. Consulting services revenues were 47 percent in 2002; by 2005 the consulting services revenues are expected to grow to 67 percent of the total market.

Investments by Governments on e-Governance will find a way to the Local Language IT market. The share of e-Governance will increase from 38 percent in 2002 to 58 percent in 2005.

The Local Language IT market constitutes of about 12 to 14 vendors. Most of the domestic players are regional and have limited access to the market. They offer both off-the-shelf products and custom made applications in all the major Indian languages. The other set of key player in the Local Language IT market are international players. International vendors are yet to take off in a big way in terms of the application offering across different languages. IBM offers a Hindi version of Lotus Notes in India. However, the participation of international vendors is expected to increase in the next three years.

C-DAC, owing to its pioneering initiatives in the Local Language IT market has acquired the leadership place with 48 percent market share in the year 2002. C-DAC is the top leader in both the product and consulting services space. Modular follows up with 23 percent market share.

5

End User Sectors for Local Language Software Market

Market Overview and Definitions

Education

India's expenditure on education peaked in 1990-91 with educational expenditure as percentage of GDP at current prices at 4.3 percent. However, the ratio has lingered in the 3.5 to 3.9 percent range for the last five years. With the government being the dominant source of funds for the education sector in India—almost 86 percent of funds for education comes from the government—and given the economic constraints that the government operates in, it is unlikely that India will see significant improvement in the education spend as a percentage of the GDP. Hence, deriving greater educational value for every rupee spent will determine the effectiveness of education for Indians.

The Indian education sector can be primarily divided into five sectors, namely elementary education, secondary education, higher education, adult education, and technical education. India has been able to achieve a commendable success in the areas of higher and technical education. Statistics on education point out that India has one the world's largest stock of scientists, engineers, and technicians.

However, India's elementary and secondary education is plagued with multiple problems. Elementary education forms the largest chunk of spending on education with about 47 percent of total spending of education earmarked for this. However, statistics show that a lot more needs to be done. The adult illiteracy rate, which is the percentage of people ages 15 and above that cannot, with understanding, read and write a short, simple statement on their everyday life, stands at 42.8 percent of the total population with almost 70 percent of the illiterates living in rural India. The ratio of pupils enrolled in primary school to the number of primary school teachers was one of the highest in the world at 43 in 1998. To bridge the distance between the current state of primary education and the government's avowed goal of universalization of elementary education, the government will have to adopt innovative mechanisms.

India's primary and secondary education is based on vernacular language medium. With a literacy rate of 58 percent, but English speaking population of only 5 percent, the medium of instruction in primary and secondary education is mainly the local language.

At the granular level, India's elementary and secondary education faces difficulties in terms of quality and efficiency, especially at the schools serving in the low-income urban and rural communities. The parameters that reflect these problems are well documented. The oft-repeated issues that have been highlighted are low student attendance, high rate of dropouts, and lack of school infrastructure. The primary education system also fails to provide a higher level of thinking and problem solving skills to students. This lack of skills impedes the progress and motivation of students to move up the education chain.

One of the main reasons for this has been the mediocre quality of teaching at the primary and secondary school levels. A teacher is expected to have 12 years of school education followed by two years of primary teacher training. However, standards vary. It is estimated that around 8 percent of the teachers at the primary and secondary school level do not meet this requirement. It is estimated that the stock of knowledge doubles every 10 to 12 years. However, the knowledge that the teachers have acquired and will impart to students is antediluvian in nature .

The government has set up multi-level teacher education schemes for the planned and coordinated development of a teacher education system. But the pedagogical approaches that are employed are classroom based on that of frontal presentation or typical classroom teaching .

Local language- based eLearning has a potential to fundamentally alter the constituents knowledge and teaching approaches that in turn will improve have benign effect on the quality of teaching to primary and secondary students.

The ability to draw benefits of local language eLearning software and content need not remain restricted to the teaching community. The real beneficiaries of the individualized interactivity will be primary and secondary school students. However, availability of budgets to set up large-scale computing infrastructure will be the critical challenge.

A number of government and private initiatives have been forthcoming in this regard. Some of them are:

- Intel, as a part of its community development plan, has set up Intel Computer Clubhouse with Katha, a NGO in Delhi. Intel has also assisted the National Association of Blind with a lab for the visually impaired.
- The Bill & Melinda Gates Foundation is supporting Bharatiya Vidya Bhavan's free, job-oriented computer training program targeted at educated, unemployed youth with a Rs. 24.25 Crores grant.

- The Union Ministry of Education in collaboration with the National Informatics Centre (NIC) has providing dial-up facility for accessing e-mail and the Internet to select educational institutions (public and private) such as schools and colleges at district headquarters where NIC has the necessary infrastructure. The Department of Education has also set up a community portal <http://www.vidyaonline.net> for teachers, researchers, and academics that allows for introspection, discussion, and examination of issues in primary education.

- The insights drawn from NIIT's innovative Minimally Invasive Education experiment have questioned many of the old assumptions on online learning for illiterates.

The common elements of these initiatives are that they are community models aimed at invigorating the quality of primary and secondary school education and that they all use English as medium of learning. Frost & Sullivan is of the opinion that the power of computing and the Internet will reach out to only a small segment of the student population if only English is used for eLearning.

Publishing Sector

India is one of the largest publishers of books in English in the world. If mass-market paperback sales have fallen, the demand for educational and scientific literature and quality paperbacks has risen proportionately. Current socio-economic developments have also affected the trade. Steep increases in material and production costs took their toll, however, the industry was able to hold out, and the scenario is now changing.

Major international firms, perceiving India as an important market, have established representative offices here. Indigenously, a younger, more venturesome generation of publishers are founding their own companies and exploring new avenues. Combined with this, the recent upsurge of interest in the creative arts, encouragement of local language writing, and a rising literacy index hold great potential for industry growth in the near future.

At present, there are about 11,300 publishing houses in India. Of these, 2,400 publish books in Hindi, and 1,800 in English. The size of the publishing houses varies. Some of the large firms publish approximately 50 original titles in a year while medium-sized companies publish up to 12 titles per annum. Besides these, there are 8,000 small publishing houses and 500 units that are run by the government and public sector, including autonomous bodies.

The profile of books published now includes translated works, since a host of publishing houses are undertaking translations. Translation studies have also gained prominence in the universities making the English departments open their syllabus to translations of Indian language texts.

Initially, publishing houses such as Jaico, Hind Pocket Books, and Sterling Publishers promoted translations but their production and writing quality left much to be desired. The few western publishing houses that sought to popularize translated Indian writing, Heinemann's Asian Writers

Series for example, abandoned the effort following a lukewarm response. Thus, only the state-subsidized Sahitya Akademi and National Book Trust persisted with translations from all languages.

In the past few years about a dozen English publishers have rushed into the field of translation of Indian language literature. Encouraged by the trend, increasingly more people are translating Indian-language literary masterpieces into English. Penguin India, Katha Publications, Macmillan, HarperCollins, Orient Longman, and Oxford University Press are some of the well known publishers of translated works. Even new publishers such as IndiaInk and Picador (in India) have declared their intention to publish translations.

Though very few works would qualify as good translations, the future looks bright. The latest Central University, the Mahatma Gandhi International Hindi University, is planning to set up a school of translation. A significant boost to translation in the next decade would be the long-term research project of the British Council, Chennai, to focus on the interface between English and the four southern Indian languages over the past 200 years.

India also boasts of 6,830 English-language and nearly 40,000 local language newspapers. Of these, 34 newspapers control 76 percent of India's total circulation of 18 million and a combined readership exceeding 132 million, as per an industry survey. However, 59 million urban adults do not read any publication despite being literate. This shows the potential for further growth in the reader base. Of the 178 million readers in India, about 46 per cent live in rural areas.

With the growing population and the increasing, albeit slow, rate of literacy, the print media experienced unprecedented growth. The daily circulation of newspapers has shown a 14-fold rise over four decades – from 2.9 million in 1956 to more than 40 million by 1996 and almost 178 million in 2001. However, there remain significant regional variations in the use of print media, given that the growth in newspaper circulation has a close relationship with literacy levels. In Kerala, 71 per cent of the population reads at least one newspaper or magazine, while in Bihar, only 15 per cent of the population reads newspapers or magazines. The changing contours of national politics, with regional parties taking center-stage, have given a new impetus to newspapers in Indian languages. According to the Indian Newspaper Society, newspapers and magazines in Indian languages sell four times more than India's English language publications. All the major groups also have strong presence in Indian language publications. For example, The Times of India Group, the most powerful, accounting for nearly 10 per cent of daily circulation, has apart from English, publications in Gujarati, Hindi, and Marathi, while the Indian Express Group publishes newspapers and magazines in English, Gujarati, Hindi, Marathi, Kannada, Tamil, and Telugu.

Even though English is one of India's two official languages (the other is Hindi), only a tiny minority of Indians speak English. However, about 60 per cent of Indian adults are literate in their own mother tongues. This means close to 500 million a class of potential readers close to 500 million for the daily Indian-language newspapers. About 40 million copies of newspapers are printed each day in India's 12 largest languages, roughly half of them in Hindi.

If the With new suggested FDI- related policies proposed now are accepted, the print media is likely to grow substantially in future. As per industry experts, with 74 percent FDI allowed in the non-news category serving food, travel, and technology sectors, a number of smaller players are likely to emerge in this category.

With 26 percent FDI in the news and current affairs program category, increase of monopolistic competition and situations where one company makes a greater more profit than the entire publishing industry, a situation faced by the print media, is expected to be avoided. Instead, a new element of competition is expected to evolve where even smaller newspapers will be able to survive and the marketing strategy is likely to be less monopolistic.

Moreover, with major international publishing houses coming into India and looking for partners they can trust, the issues of corporate governance is likely to be addressed seriously. Hence, the FDI in print media is expected to improve the situation such that all players and stakeholders can gain.

The print media is in a dynamic stage with the launch of many new publications, newspapers in local languages, and multiple editions. With the emergence of new small players and the entry of foreign players, the industry is expected to get competitive. Technology adoption is likely to be one of the key differentiating factors. While the larger players have adopted some of the Indian language software, there is greater potential with the increased competitiveness in the industry.

Small and Medium Enterprises

The importance of the small-scale industries (SSI) sector is well-recognized for its significant contribution to the socio-economic objectives of growth through employment generation, output, exports, and fostering of entrepreneurship. Currently, the sector accounts for around 95 percent of the industrial units in the country contributing to 40 per cent of the manufacturing sector output and approximately one-third of the nation's exports. At the end of March 2001, there were 3.37 million modern SSI units providing direct employment to around 1.86 million persons.

The role of SSIs in the economy can be seen from the fact that they now account for 95 percent of all industrial units in the country and 40 percent of total output. About 7,500 products are manufactured in the small-scale sector. The export share of SSI units is 35 percent. The composition of exports shows the largest shares of SSIs are in the industry groups such as hosiery and garments (29.0 percent), food products (21.4 percent) and, leather products (18 percent). The industry groups that have recorded high growth rates and a large share in total production of SSIs are textile products, wood, furniture, paper and printing, and metal products.

The future policy focus for SSIs is expected to be on the development of industrial clusters that have been efficient in terms of resource use and in promoting inter-industry and inter-sectoral linkages. A cluster is defined as a geographically bound concentration of similar, related, or complementary businesses. There are estimated to be 350 SME clusters in India that contribute directly and indirectly

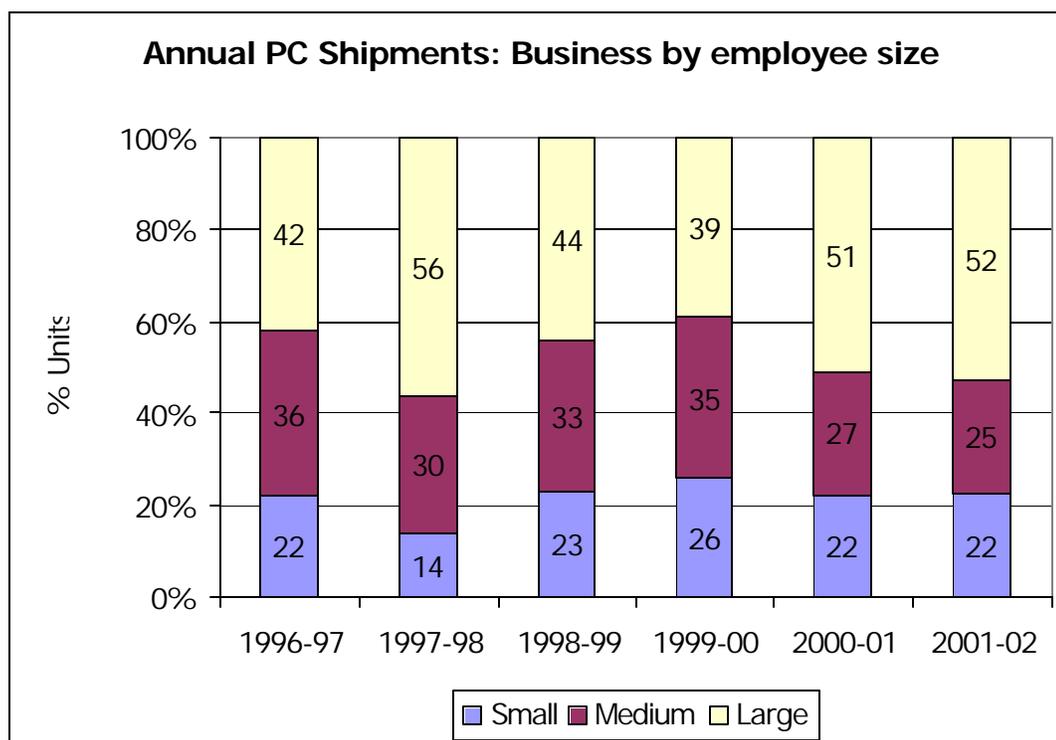
to 60 percent of India's exports. However, the spatial concentration in clusters will mean a slower dispersion of industrial activity to backward areas. The location-wise distribution of clusters shows 65 percent of them concentrated in cities and metros and only 13 percent in small towns and rural areas.

The SME end-user segment is also growing very fast. According to MAIT, small and medium segments together purchased over two-thirds of PCs sold in the market in 1998-99. Small enterprises (employing less than 10 employees) registered a volume growth of 120 per cent and medium enterprises (employing 11-50 employees) recorded a 48.8 per cent growth. Contrast these with the 5.5 per cent sales growth in large companies.

Figure 5-1 shows the PC sales by business type in India in 2002

Figure 5-1

PC Sales by Business Type in India, 2002



Note: All figures are rounded; the base year is 2002. Source: MAIT

Banks

Nationalized banks dominate the banking scenario in India. Of the 274 commercial banks operating in the country, 223 are public sector banks and 51 are private sector banks. The private sector grid also

includes 24 MNC banks currently operating in the country. In terms of location, around 73 percent of banks branches are located in rural or semi-urban areas.

Growth of number of bank branches in India has been very gradual over since 1999. It is significant to notice that while the number of metro/ urban and semi-urban bank branches has been growing rapidly, rural bank branches have not witnessed any growth in numbers. About 78 percent of primary urban co-operative banks branches are computerized, while only 47 percent of state co-operative apex rural development banks branches are computerized. More than 57 percent of state co-operative banks {bank branches} and 60 percent of central co-operative banks branches are also computerized. About 35 percent of regional rural bank branches are also computerized.

Figure 5-2 shows the number of banks and branches in India.

Figure 5-2

Local Language Software Market: Number of Banks and Branches (India), 2001

Bank Type	No. of Banks	No. of Branches
Rural Co-operative Banks		
2-Tier structure State Co-operative banks	28	797
Primary Agriculture Societies	90,840	
Central Co-operative Banks	367	12,128
Unitary structure State Co-operative Agriculture and Rural	8	1,073 Development Banks
Federal structure State Co-operative Agriculture and Rural	11	81 Development Banks
Primary Co-operative Agriculture and Rural Development Banks	745	6,860

Source: RBI

Co-operative credit institutions occupy an important position in the financial system of the economy in terms of their reach, volume of operations, and the purpose they serve. Rural co-operative banks play a pivotal role in the rural credit delivery system with credit co-operatives forming almost 70 per cent of the rural credit outlets. Rural co-operative banks account for around 30 per cent of rural deposits and 44 per cent of the outstanding loans and advances of the banking system for agriculture and rural development. About 55 per cent of the short-term production loans for the agriculture sector come from co-operative credit institutions. Urban co-operative banks on the other hand, aim at mobilization of savings from the middle - and low-income urban groups.

The total number of branches of commercial banks was 65,800 in June 2001. Among these, rural branches accounted for 49.6 percent of branches of commercial banks in India, followed by semi-urban branches at 22.1 percent, urban branches at 15.5 percent, and metropolitan branches at 12.8 percent.

Banks have a high usage of local language in documentation, both at semi-urban and rural level. Typewriters and manual methods are used extensively where processes are not computerized.

However, despite computerization most of the customer interface tasks in local language need to be manually done. The main application areas are banking software, word processing for documentation, and data processing.

Health

The national healthcare scene has undergone significant changes in terms of structure, control, and policies. Currently, the contribution of private healthcare is principally through independent practitioners. Also, the private sector contributes significantly to secondary-level care and some tertiary care. It is a widespread perception that private health services are very uneven in quality. Private health services are also perceived to be expensive.

The increasing spread of information technology raises the possibility of its adoption in the health sector. The National Health Policy is likely to examine this possibility. One of the suggestions that are likely to spur the use of IT in healthcare is the plan to establish an integrated system of surveillance, national health accounts, and health statistics by 2005.

Some of the statistics and trends revealing the status of the healthcare sector in India include:

- The national average of proportion of households in the middle to and higher middle income group has increased from 14 percent in 1990 to 20 percent in 1996.
- Private insurance is expected to drive the healthcare revenues. Considering the rising middle and higher middle income group, about 200 million insurable lives are estimated.
- The population to bed ratio in India is 1 bed per 1,000, in comparison to the WHO norm of 1 bed per 300.

Corporate hospitals mushroomed in the late eighties. However the boom remained short-lived. A fragmented market, lack of statistics, capital intensive operations, and a long gestation period all prevent investments in the healthcare industry. Government and trust hospitals dominate the scene. Many of the trust hospitals suffer from poor management. Good corporate hospitals are still too few to amount to a critical mass. However, this trend is likely to be reversed with the coming together of insurance, hospital hardware, and software companies.

Healthcare is racing toward high-tech, automated technologies and health agencies wanting to distinguish themselves from the pack will have to opt for leading-edge technologies. One of the options extensively explored has been for healthcare delivery through the application of telecommunications technology. This will help transfer electronic medical data, including high-resolution images, sounds, live video and patient records from one location to another via telephone lines, ISDN, modem, Internet, satellites, video-conferencing, and so on.

Apollo Hospitals and Escorts Heart Research already have tele-cardiology systems that help monitor the condition of cardiac patients. All the patient needs to do is to place the gadget near his heart and dial his hospital's heart command centre. Images of the heart and ECGs that the hospital receives (via satellite) help them to prescribe the immediate treatment or first aid required. However, such cases of technology adoption are extremely limited.

Private pharmaceutical companies have made their presence felt on the Internet by establishing web sites focusing on the key health problems or diseases that are being addressed by their products. As a key strategic tool, IT is being used by Glaxo to create awareness among medical practitioners by giving them exposure to medical applications on the net, tele-medicine, and so on. Also, Apollo has commissioned a Rs. 35.4 Crores tele-medicine project and will launch a web site by 2003.

All this is expected to result in better care at lower costs and the new technologies available will help streamline processes, integrate data, and monitor care.

Another initiative in the area of public health services has been by the United Nations. The Health InterNetwork (<http://www.healthinternetwork.org/>) brings together the international development community, governments, the private sector, foundations, and non-governmental organizations in a global partnership to improve public health using Internet technologies.

The Health InterNetwork aims to support and strengthen public health services and to provide access to high quality, relevant and timely health information. It further aims to improve communication and networking among public healthcare workers, researchers, and policy makers. The foundation of the project is an electronic / Internet-based Health InterNetwork (HIN) portal that will provide access to this information and to networks of policy makers, researchers, and health service providers. As part of the HIN, connectivity and training will be also be provided at over 10,000 information access points across developing countries.

Events discussing the role of IT in primary healthcare, health education, hospital management and tele-health are organized. IT is widely being acclaimed to be the transformation tool for delivery of services in the healthcare sector. Adoption of IT for computer-based patient records, hospital information systems, computer-based decision support tools, community health information networks, tele-medicine, and new ways of distributing health information to consumers are being recognized.

However, the Indian healthcare sector is still reluctant to invest a percentage of its operating revenues in IT infrastructure. The other reasons for slow adoption of automation technology are the lack of industry standards and diversity of industry participants in the industry.

On the other hand, deployment of Information Technology in the organized public healthcare sector and government-owned hospitals and institutions has been non-existent.

With the current setup and industry structure, Frost & Sullivan is of the opinion that the penetration of IT is very low across the sector. To spread IT penetration outside the corporate hospitals, it is essential to outline policies recommending use of IT, maintenance of computerized records, and so on. A

significant adoption in the healthcare sector will occur with computerization of government-owned healthcare institutions. Otherwise, the benefits of IT are likely to be limited to a small set of the population.

Tourism

Travel and tourism is the world's largest industry in terms of employment and second to the oil industry in terms of turnover. It is a service-based industry. The industry broadly covers the following areas:

- Hotels, restaurants, and tourist complexes
- Travel agencies, tour operators
- Transport facilities for tourists
- Amusement, entertainment, and sports units for tourists
- Units providing cultural, adventure, and wildlife experiences to tourists

Domestic tourism market estimates derived from WTTC Tourism Satellite Accounting System pegs the market size at Rs. 88270 Crores and is almost 3.65 times the receipts from International tourism which is pegged at Rs. 24250 Crores for the year 2001.

The Department of Tourism under the Central Government is the nodal agency for the formulation of national policies and programs and is assisted by the Director-General of Tourism, with offices in India and abroad. The State Directorates of Tourism are responsible for the publicizing and promoting travel within India for domestic tourists. The Tourism Finance Corporation of India has been set up to meet the loan requirements of the tourism industry.

Post Sept 11, domestic tourism has taken off in a big way. Indian citizens are not only traveling more often but there is also an appreciation of broader set of tourist destinations. Religious and pilgrimage circuits are also finding large tourist participation. A tourism culture is forming and if this trend is nurtured, tourism can acquire the size of an industry. This is also reflected in the fact that Ministry of Tourism in its tourism policy 2002 is laying special thrust on domestic tourism as an engine of growth for the Indian tourism market.

Growth of Tourism market depends on the information dissemination to the potential tourists about the sites. Prospective tourists acquire information to gauge the likely travel experience at the tourist site and find information for travel, boarding and lodging. Information dissemination happens through multiple sources and includes friends and relatives as well as tourism promotion bodies. Tourism brochures and web site play an important role in dissemination information to the prospective tourist. Most of the literature and content available on domestic tourism is available in English. Dissemination

of information through the corresponding state local language will increase information penetration amongst the prospects which in turn will lead to an informed desire to travel.

Summary

Local Language IT applications are expected to find uses across a wide segment of the market viz in the Government, Private sector and Public enterprises. However, the extent of impact will not be uniform across these verticals. Frost & Sullivan evaluates the likely impact of Local Language IT on the key segments of the market.

Education

The Government of India is likely to face multiple challenges in achieving the avowed goal of universalization of elementary education. The key challenges are:: stagnant expenditure on education as a percent of GDP, the adult illiteracy rate and the large school dropouts in the primary and the secondary education. The Indian education sector is facing challenges as a result of the change in the economic constitution of the world: world over, the knowledge segment of the economy is acquiring larger dimensions. These challenges mean that the Indian education sector will have to focus on fundamental quality and efficiency of the education output.

The real beneficiaries of the interactivity through Local Language IT will be the primary and secondary school students. A number of government and private initiatives have been forthcoming in this regard. However, the availability of budgets to set up a large-scale computing infrastructure will be the critical challenge.

Publishing Segment

Indian is one of the world's most vibrant markets for books, newspapers and magazines. While a sizeable number of citizens are already in the category of "regular readers", the market is expected to continually grow because of the increasing number of educated citizens in India.

India has a large segment of vernacular language publications including books, newspaper and magazines. For example, India has 6,830 English-language and nearly 40,000 local language newspapers, although 34 newspapers control 76 percent of India's total circulation of 18 million and a combined readership exceeding 132 million. With the demand for books, magazines and newspapers is expected to grow, Local Language IT products will increase the opportunities to provide end to end solutions to the publishers in the form of desk top publishing and Local Language computing hardware.

Small & Medium Enterprises

Small scale industries (SSI) produce 40 percent of the manufacturing sector's output and account for around 95 percent of industrial units in the country. While PC shipments to Small & Medium Enterprises (SME) have been falling, Frost & Sullivan expects this trend to be temporary. SME's

have been late adopters of IT for multiple reasons: Lack of appropriate applications, high prices of PC hardware and lack of relevant knowledge

Since the lingua franca of business that the proprietors of the SMEs employ is local language, Local Language IT has the potential to proactively increase the chances of IT adoption. Local Language accounting applications and ERP systems will be the leading applications that will drive the demand in the SME segment in India.

Banks

Banking institutions have changed the rural and semi-urban economies by providing a channel for the movement of credit and savings in India. Co-operative credit institutions occupy an important position in the financial system of the economy in terms of their reach, volume of operations, and the purpose they serve.

To serve a wide section of the population in rural and semi rural areas, rural branches have deployed bilingual forms and are high users of documents in local language. Typewriters are employed on a wide scale. Local Language IT systems can replace these manual and semi-manual systems and thus provide banks and the citizens with the benefits of technology. Tourism

The tourism industry in India is increasingly driven by internal demand. Indians are traveling more often for business, leisure and for religious purposes, resulting in a thriving domestic tourism industry. Tourists depend on public media and advertisements to gain knowledge of tourist destinations. Cross-state travel can increase if knowledge sources such as web sites, brochures and literature are made available in state languages from where the travelers are expected.

6

E-Governance Initiatives and Potential for Local Language Market

Background

The buzz around e-governance has become stronger over the past couple of years. Several countries in Western Europe and developed nations of the Asia Pacific region are already way ahead in adopting and implementing e-governance systems, thereby setting up transparent, efficient, and quick government transactions. A few countries such as Jordan, Mauritius, and Saudi Arabia are developing national-level plan to implement e-governance. Other large countries such as India, where a number of isolated projects have already been implemented, are creating mechanisms to force the pace of implementation, integrate these isolated examples of e-governance, and achieve widespread e-governance. The government understands the importance of satisfying the needs of citizens and is making governance convenient from the citizen's point of view. Each state government has set a goal for itself besides preparing a roadmap to take information technology to the grassroots levels. Each of the governments is now extending its policies, incentives, and funds to be able to provide SMART (Simple, Moral, Accountable, Responsive, Transparent) governance to its citizens.

Although the need for e-governance is understood by all the states, the level of involvement in e-governance of various states differs. This is primarily due to constraints such as lack of resources, natural calamities, and terrorism that pose a strong hurdle to the allocation of sufficient funds for the e-governance initiative.

A number of projects that have proved significantly beneficial have allowed the state governments to go ahead with their plans. However, caution needs to be displayed during the selection and implementation of e-governance projects. Very few projects flagged as successful have actually proved so. This is apparent from the four evaluation studies of successful projects in India, commissioned by the World Bank and conducted by agencies independent of the project implementers. As part of this study, the impact and extent of benefits was assessed by surveying the key stakeholders and beneficiaries. Of the four projects that were deemed as benchmark successes in their initial phases, two of them are yet to acquire a significant velocity.

In a project where rural kiosks were created by the district administration, the usage level has been dismal and on occasions these kiosks are locked. Reasons vary from erratic power supply, poor connectivity, manual processing of service requests, and language incompatibility. In yet another project where revenue was being collected at inter-state check posts, the infrastructure has ceased to work and the operators have withdrawn. Factors such as discontinuation of services of project implementers, lack of interest of new administration, and no political support put the future of the project in jeopardy.

In view of this, it becomes essential to define the parameters for measuring the sustained success of an implementation. The overall infrastructure for these projects has to be upgraded and language incompatibilities have to be taken care of. Local language support with multiple language choices can be one of the major success factors as end users become more accustomed to using these kiosks and revenue collection centers.

Figure 6.1 shows the total estimated government spends on e-governance initiatives by some of the leading states in India over a period of four years until 2001.

Figure 6.1

Local Language Software Market: Total Spend on eGovernance in Rs. Crores by States (India), 2002

Project	AP	Maha	MP	Guj	WB	Karn	Ker	UP	Raj	TN	Pun
LR	30.3	30.3	30.3	-	30.3	30.3	15.2	15.2	15.2	30.3	-
LA	50.5	-	-	-	-	-	-	-	-	-	-
eseva	5.0	5.0	-	0.7	-	-	6.1	-	-	-	-
trans	0.5	-	-	1.0	1.0	1.0	-	1.0	-	-	-
Muni	2.0	-	-	-	1.0	3.1	-	1.0	-	-	-
Gov	21.2	21.2	-	64.7	64.7	-	21.2	21.2	21.2	-	-
Oltp	2.0	-	-	-	-	-	-	-	-	-	-
Fin	4.6	-	-	-	-	-	-	-	-	-	-
Proc	-	-	-	-	-	2.0	-	-	-	-	-
Hr	1.0	-	-	-	-	-	-	-	-	-	-
Welf	1.0	-	-	-	-	-	-	-	-	-	-
Police	16.2	-	-	-	16.2	16.2	-	-	-	-	-
vadodra	-	-	-	1.2	-	-	-	-	-	-	-
treaus	-	-	-	1.0	-	1.0	1.0	1.0	-	-	-
website	-	-	-	1.0	1.0	1.0	-	-	-	-	1.0
tax	-	-	-	-	-	1.0	-	-	-	-	-
insurance	-	-	-	-	-	1.0	-	-	-	-	-
environ	-	-	-	-	-	1.0	-	-	-	-	-
SSI	-	-	-	-	-	1.0	-	-	-	-	-
griev	-	-	-	-	-	-	-	1.0	-	-	-

Key: AP = Andhra Pradesh
MP = Madhya Pradesh
WB = West Bengal
Ker = Kerala
Raj = Rajasthan
Maha = Maharashtra
Guj = Gujarat
Karn = Karnataka
UP = Uttar Pradesh
Pun = Punjab
TN = Tamil Nadu

LR=Land Record
LA=Land Administration
eSeva=Citizen Services in AP
Trans=Transportation
Munci=Municipal Corporation
Gov=Government Applications
OLTP: Online Transaction Processing
Fin: Financial Application
Proc=eProcurement
HR=Human Resources Mgmt
Welf=Social Welfare Mgmt Appln

Police=Police Application
Vodadra=Civil Administration Appln
Treaus=Treasury
website=G to C portals
Tax=Tax application
Insurance=Insurance application
Environ=Environment mgmt appln
SSI=Small Scale Industries appln
griev=Grievance

Note: All figures are rounded; the base year is 2002 Source: Frost & Sullivan

Figure 6.2 shows the local language market revenues by in India, in 2002.

Figure 6.2

Local Language Software Market: Percent of Revenues by State (India), 2002

State	Revenue (%)
Andhra Pradesh	23.6
Gujarat	12.9
West Bengal	12.4
Karnataka	10.3
Maharashtra	9.9
Kerala	8.3
Rajasthan	6.4
Uttar Pradesh	5.5
Madhya Pradesh	5.3
Tamil Nadu	5.3
Punjab	0.2

Note: All figures are rounded; the base year is 2002. Source: Frost & Sullivan

The usage of local language software is expected to attain greater importance in the overall success of e-governance initiatives. In the following pages, Frost & Sullivan throws light on the major e-governance initiatives across various states in India in this study.

Summary

There is an overall consensus on the benefits of e-Governance in India. While a wide variance exists between states in terms of their e-Governance initiatives, it is expected that over the medium term, a greater number of states will provide services to citizens over the electronic medium. Deploying Local Language IT as a part of State and Central e-Governance implementations will serve the cause of improving the reach and quality of services offered across a wide section of the citizens.

State Governments have deployed citizen services in local languages and the early benefits are clearly visible. Early Government-to-Citizen Portals such as eSeva have proved the feasibility of the model. Frost & Sullivan expects this trend to extend on both scale and scope: a wider bouquet of services will be available to a larger section of citizens.

Andhra Pradesh is the state with the biggest spend on Local Language IT contributing 23.6 percent to the total market revenues for the Industry. Gujarat is the second highest spender followed closely by West Bengal.

7

Strategic Recommendations

Ecosystem

The history of successful technology evolution suggests that no company or technology succeeds by itself. Rather enduring success stories have been created when the technology sponsors have been the leaders and shapers of the suppliers, customers and others who all mutually benefit from the association.

Complex technologies often involve a network of related or compatible technologies and support infrastructure that make it available for widespread usage. Issues of technology compatibility and infrastructure requirements influence the patterns of new technology adoption. Each of the participants in the Local Language IT framework has complimentary relationships with the others and thus together, they form a self sustaining ecosystem. The synchronized evolution of the participant's actions and strategies will determine the contours of the diffusion and adoption curves of the target markets.

The key participants in the Local Language IT Industry are:

Vendors

Vendors in the local language IT market include players that produce, market, consult, or support products and solutions for local language machine translation, local language operating system, local language human machine interface system, and local language tools. The market constitutes players that are both domestic and multinational in terms of their origin. International players include IBM, Microsoft, Adobe, Quark, etc. Domestic players include CDAC, Modular, Mithi, Summit, Encore, etc.

Academia & Research

The research and academic community is playing a concerted role in terms of developing and stabilizing innovations that promise to fulfill both the current and potential needs of the local language IT market.

One of the perennial challenges that research and academia face is with respect to the decision point at which a new technology can be launched. ‘Launch it early and the product flops, launch it late and competing technologies have captured the market shares’, is the existential dilemma that academia and research community face.

Government

The Governments’ objectives in the local language IT ecosystem are manifold. Some of the key objectives of the Government in ensuring a larger adoption of local language IT are as follows:

- Increasing widespread education of the citizens
- Evolving an environment that fosters innovation and productivity benefits of technology amongst individuals and businesses
- Ensuring an equitable distribution of the productive benefits of technology amongst the citizens

The Government can play a critical role in the wider diffusion of the local language IT in three ways:

- By adopting local language IT as a user for Government to Government transactions
- By adopting local language applications in its interfaces with the citizens and businesses
- Funding and encouraging research and development programs in the area of local language IT
- Devising policies that enable and encourage private sector participation in areas that directly and indirectly influence the local language IT adoption

Both the Central and State Governments in India have taken multiple steps in this regard.

Industries Association

Industry associations have been evangelizing and encouraging complimentary technologies that would stimulate the usage of the products and services of the industry that they serve. Industry associations like the MAIT, ESC, NASSCOM etc. also play an important role in directing the viewpoint and efforts of the Government decision makers to their constituents.

For the ecosystem to succeed, each of the member participants in the ecosystem will have to fulfill the potential of their roles and follow given strategies

Figure 7-1 shows the agenda’s that the participants in the ecosystem will be required to follow.

Figure 7-1

Agenda of the participants

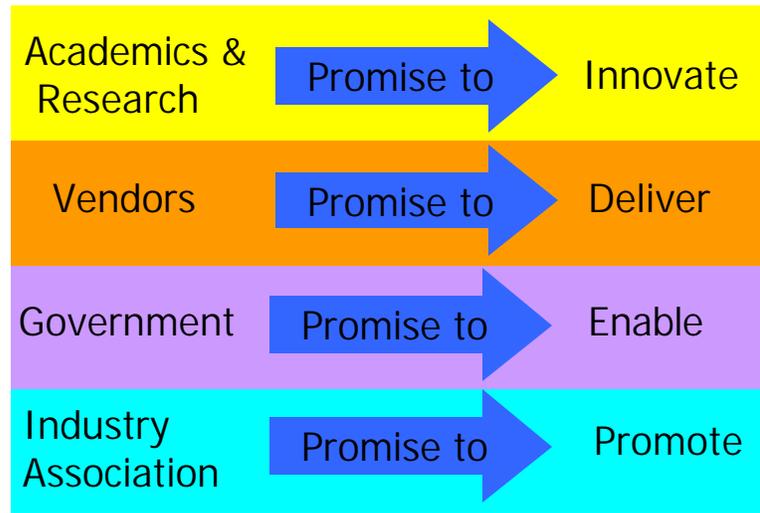


Figure Source: Frost & Sullivan

Strategies of the Ecosystem

Local language computing hold the potential to fundamentally transform the way the Indian populace interacts and transacts, by providing them tools of the modern world in a medium that they can follow. The benefits of local language computing are many and have been outlined in the earlier chapters. However, the challenge is to manage the leapfrog to a realistic landing point. Well thought of strategies and the commitment for their implementation will decide the success or failure for the Local Language IT market.

Frost & Sullivan identifies key strategies that the constituents of Local Language IT ecosystem will need to follow.

Government

The Central and various state Governments will be required to play an enablers role for the Local language IT market to take off in a sustainable fashion. The Government's enabling role will encompass two strands: the first ion technology and the second on the market:

■ Managing R&D and Technology Transfer: Setting the Core

- The success of the open software movement has set the precedence for the successful management of distributed innovation. The key learning have been that community based models with an open system can deliver results. However, pure community based models are unlikely to work in the current setting of the local language IT development. A strong

sponsor with minimal conflict of commercial interests can provide a deep connectivity with partners that will result in speedy delivery of the innovations to the market.

- The Government of India through its various agencies has been the first port of call for the development of Local Language Innovation in India. However, because of distributed development initiatives, the key challenge is to sensitize the product development teams to market forces.
- There is a strong need to pull individual organizations into a circle of shared concerns particularly from the point of view of transfer of knowledge. TDIL under Ministry of Communications & Information Technology will be required to guide the communication of shared concerns. TDIL will be increasingly required to acquire the feedback from market, including the vendors and end users and inform the same to R & D and Academia. TDIL will need to create a formal structure that enables this market feedback mechanism.
- Embedding market structure in the technology development process will filter pre-mature technologies from mature technologies for technology transfers to market.

■ Aggregation

- The government must create and fund a web-based repository of best practices for content, software and language based applications. These should be part of central and free public domains. The repository of best practices should also include state and local practices. These best practices should be shared across government agencies, NGOs, academia, and vendors. This can be accomplished through cross-agency pilot projects, and bringing the private sector closer to public planning; therefore, new local language initiatives that are part of e-Governance projects will be relevant and cost effective. Investments in research and development through partnerships with academic institutions, and policy and development support by the NGO community would also be effective. The TDIL in MIT could organize meets on a regular basis to share best practices, analyze innovative strategies, and evaluate existing systems, so that each participant can take home components that work for their own innovations.

■ E-governance

- Various Central and State Governments' initiatives on e-governance present an opportunity to employ local language office productivity tools for all the government-to-government, government-to-citizens and government-to-business transactions. This move will be in

consonance with the government's current policies of having all the administrative, legal and regulatory documents in the state's local language.

- The challenge that Governments are facing in implementing e-Governance initiatives are two fold. The first is in terms of constraints in budgetary allocation and the second is in terms of sequencing the rollout of different e-Governance initiatives. Central and State Governments will need to increasingly explore new revenue models that are based on fees from users of services and in partnerships with vendors.
- Adoption of Local Language IT as a front end medium opens up e-Governance interactions to a wider segment of the population and brings a faster and stable ROI for Government's and vendor partner's investment
- With the availability of a mechanism through Local Language IT that ensures wider participation of masses for availing the e-Governance services, sequencing e-Governance roll-out can be determined by solutions that go to address the most pressing problems of the state.

■ Exports

- Government's aggregation initiatives will open up the opportunity to tie up with international vendors and international research institutes tapping the opportunity for the know-how relating to Local Language technologies.
- TDIL will be required to identify specific nations and open dialogue with the respective Governments, local companies engaged in the business of Local Language IT to explore possibilities of sharing R & D patents and technologies for monetary considerations.

Vendors

Vendors serve the *Delivery Agenda*. The *Delivery Agenda* for Vendors includes ensuring product availability, support and solutions

■ Product Availability- "Say's Law: Supply creates it's own demand"

- Vendors who ensure larger availability and product support across segments will acquire the status of market leaders. Equally important will be how vendors acclimatize the existing hardware to new technologies that are available. The Indian language applications are based on font standards such as ISFOC. The existing input output devices need to be made compliant to the local language fonts. The printers for instance need special drivers to be

able to print the data in local languages. Phonetic keyboards need to be introduced or an overlay provided for the QWERTY keyboards.

■ Solution Focus

- Vendors will have to manage high product failure rates in the initial phase of market development. A good strategy to follow in this regard will be frequent product modifications and version upgrades. A solution focused strategy will call for an expansion of the solution basket where Vendors on one side provide value-added, scalable solutions in local language but at the same time also provide integration tools to integrate the front end solution to the middle end and the back end of a larger enterprise class application. A selective expansion strategy with regards to acquiring or building Integration skill sets can provide a unique differentiator to Local Language IT players as compared to an incumbent system integrator.
- Adopting a vertically focused solution and sales strategy presents another opportunity for the Vendors to entrench into a vertical with growing market potential for their hardware and software solutions. Verticals such as Publishing require a customized solution to capture the unique nuances of their industry. The present local language publishing applications are predominantly desktop based and do not provide the scalability of an enterprise class application. Richer functionality and successful pilot sites in a particular vertical market provides a proof of concept for other prospects in the same vertical. At the same time, the incremental costs for serving other customers in the same vertical decrease thus providing a greater value to the Vendor.

■ Exports

- A strong foot hold and deep insights in the design and development of Local Language Technology provides opportunities to the Vendors to export these technologies to other non-English speaking markets. Since, other developing economies are wrestling with similar issues, customizing the underlying technology to other languages such as Arabic and Persian opens up large market opportunities.

■ Managing the Product Life Cycle

- In today's market conditions, the characteristic of Local Language hardware and software sales is that of a solution sale. However, as the market expands, solution sales will give way to mass market product selling. The challenge that Vendors will have to confront is the management of the transition from a solution oriented company to a mass market product company. Managing the product, promotion, channels and price through the various market

stages will be at the core of this transition. A distinguishing characteristic of Vendors who manage this transition well and those that don't will be how proactive Vendors are in terms of seizing market opportunity rather than meeting the immediate needs of the demand markets.

- Clear and defined processes need to be laid down based on best management practices and be localized to suit the current application environment. Apart from this, the internal selection of products, that the company needs to channelize its resources into, should follow a critical evaluation process.

- Communicate with other Stakeholders

- Vendors will need to create formal channels of communication to provide a collective market feedback on the evolution of products and technologies to other stakeholders in the ecosystem. Such a feedback will cut product failures and at the same time sensitize the product development community to work on the immediate concerns of the vendors.

Academia and Research

- Academia and Research serve the *Innovation Agenda* of the Ecosystem. For the Academia and Research bodies to fulfill their promise of Innovation, Frost & Sullivan proposes a number of recommendations.

- Greater integration of Academia and Research bodies with the other players is likely to positively impact the efficacy and efficiency of technology and product developments. While, on one hand, there are scores of success stories in terms of market adoption of products delivered by the Academia and Research community, there is at the same time a considerable disconnect between research and the market adoption of the same.
- For many projects, the pace of product development has been tardy because of technology challenges and resource constraints. However, what has piqued Vendors is the apparent disconnect between R & D and smooth technology transfers to the markets.
- Academia and Research Bodies will have to adopt better management practices that lead to better project management of the R & D efforts. Also equally critical will be market feedback mechanisms that R & D embeds at the product planning stage.
- Academia and Research Bodies can form alliances with Vendors or bid for sponsorships from Vendors in the Local Language IT market. These approaches will help to mitigate funding constraints. Vendors will get the benefit of commercializing the technology and

earning profits through the sale. With an increased role of private players in the R&D efforts, issues related to commercialization would be also handled simultaneously, leading to a faster lab-to-market cycle. Consolidated efforts and a joint role by public and private sector will ensure the right mix of intellectual, financial, and project management resources leading to roll-out of commercial products within the assigned timelines.

■ Development of Content

- Availability of content in Local Languages will drive the adoption of Local Language IT application by the masses. Success of models such as Project Gutenberg provides an indication of what can succeed in India. Various forms of Indian literature in all local languages provide a lot of scope for generating content. The publication sector is a significant beneficiary of local language technology. Epics and important literature in various languages can be replicated in digital form and made accessible. Developing local language content and knowledge base requires a large amount of investment and responsibility. The issue of content creation needs to be given a thought by all the players including the industry associations, the TDIL and the academia.

■ Standards

- Finalization of standards at multiple levels, viz., for font, for script, for indexing and for keyboard should be taken up on an urgent basis. With the finalization of standards, some key impediments would be taken care of and issues such as interoperability and isolated applications would be resolved. To meet the soaring demand from the users, efforts are imperative from all the stakeholders in the direction of standardization. To remain in sync with the global developments on standards and to ensure building of world class solutions in local languages, India has to actively participate in some of the international initiatives. Global Initiatives such as TEI and OLAC need to be attended so as to address the unique language requirements. Since every language is different with respect to their phonetic nature and glyph coding, it is important to make adequate representation for Indian languages in global initiatives. Ultimately this will ensure availability of widespread global content in Indian languages and vice versa. This will ultimately benefit the local language information seeking citizens.

Industry Association

Industry Associations serve the *Promotion Agenda* of the Local Language ecosystem. Industry Associations will be required to play multiple roles in the evolutionary path of Local Language IT Industry

- The early phase of the market for Local Language Applications demands a good coordination mechanism between the R & D Labs and Vendors. A leadership role from an Industry Association can act as the fulcrum to balance the private sectors and the Government's interests in this phase of product market evolution.
- There are numerous companies in the local language computing market with multiple products. Differentiating between products is difficult for the potential users. Almost all the companies have a low brand image or recall. Hence, choosing a product is mostly on the recommendation of the distributor or reseller. To provide value and direction to users of off-the-shelf products, and clear the doubts of potential customers, an evaluation and certification authority may be required for technical and functional evaluation followed by certification. An Industry Association can take the lead to set up such a committee.
- For the industry to acquire critical momentum, the Industry Associations will need to champion the cause of the industry with different stakeholders. Public conferences, leveraging mass media and establishing thought leadership will be crucial for the sustenance of the Industry. Combined Vendor efforts and budgets can be channelised through Industry Associations in this regard.
- The Industry Associations can also take the lead in developing Virtual Labs in the country which could lead to the development of innovative local language applications for the citizens.
- One of the more important strategies of the associations could be that of guiding the research labs for facilitating technology transfers.

Summary

Frost & Sullivan expects that State & Central Governments, the Academia & Research institutions, the Vendors and the Industry Associations will all play a proactive role in expanding the addressable market opportunity for Local Language IT in the years to come. Each of these four elements have a role that is influencing the evolutionary trajectory of the industry. Together these four elements form an ecosystem that will nurture the fledgling Local Language IT industry. Frost & Sullivan proposes a number of strategies for the players.

Government

- TDIL is sponsoring research and coordinating the distributed network of R & D centers across India. At the same time, TDIL is ensuring technology transfer to the public and vendors. For the market to expand faster, technology adoption will need to be accelerated and vendor and end user feedback and concerns will be required to be conveyed to R & D.
- The Government must create a web based repository of best practices for content, software and language based applications and this must be available in the free public domain.
- The State and Central Governments must be mandated to deploy Local Language interfaces on the citizens front

Vendors

- Following the dictum, 'Supply creates its own demand', vendors will need to ensure a wider availability of their products and solutions for their prospective customers. While traditional distribution channels will help, Vendors will also need to ensure that their products are available with DG S & D (Directorate General of Supplies and Disposal) and Apna Bazars for easy purchase by Government.
- Vendors will have to broadbase their approach to position Local Language IT as a solution that will solve genuine customer problems. This will also call for building and expanding the skill sets to bid for the emerging solutions market around Local Language IT.
- Vertical focused strategies are expected to fetch good returns. Vertical Local Language IT solutions will provide the depth to the solution and meet the unique nuances of the industry thus making it easier for buyers to get faster returns on their technology investments.
- Export of products & solutions and the underlying technology itself will provide a powerful opportunity to Vendors and also provide a faster return on the research and development investments.

Academia & Research

- A greater integration of the Academia and Research Institutions with the Local Language IT ecosystem is likely to positively impact the efficacy and efficiency of technology and product developments.
- The Academia and Research Institutions will have to adopt better management practices that not only lead to better project management of the R & D efforts but also lead to development of market feedback mechanisms.

- The Academia and Research Institutions should form alliances with the Vendors or bid for sponsorships from Vendors for Local Language IT application development.
- The availability of content in Local Languages will drive the adoption of Local Language IT applications by the masses. Academia and Research should take a lead in publishing local content from epics and literature.
- Finalization of standards at multiple levels, viz., for font, for script, for indexing and for keyboard should be taken up on an urgent basis.

Industry Association

- Industry Associations serve the promotion agenda for the Industry. They should play a proactive role in smoothening the information flows between all the players
- There is a genuine need for an evaluation and certification authority to dissipate doubts in the minds of the prospective users. The Industry Associations can take the lead to set up such a committee.
- Industry Associations will need to champion the cause of the industry with different stakeholders. Public conferences, leveraging mass media and establishing thought leadership in will be crucial for the sustenance of the Industry.

8

Methodology for Research on Local Language IT Market

Research Methodology

Frost & Sullivan's Market Engineering™ methodology has been tested and refined throughout our company's 39-year history. An emphasis on primary research guarantees up-to-date information direct from key players in the market.



Other benefits of the Market Engineering™ methodology:

- Information is directly from the marketplace, and not from an individual guru whose perspective may be biased
- Multiple perspectives are examined to cross-check answers and assure valid conclusions
- A team approach ensures that individuals with the appropriate skill sets work together to meet the study goal

- Frost & Sullivan’s continuous research in the Telecommunication & IT markets gives it access to many of the key market players, with contacts at every level of these organizations.

Primary Research

Frost & Sullivan’s analysts conducted in-depth interviews with the key participants in the Local Language IT solution vendors and end users across various business verticals, academia, government bodies and associations.

While structured questionnaires were used to guarantee coverage of all the desired issues, Frost & Sullivan analysts conducted interviews in a conversational style. These result in a more thorough exchange of views with the respondents, and offers much greater insight into the relevant issues than conventional interviews may provide.

To address the market exhaustively, Frost & Sullivan conducted 33 interviews. The various companies and associations that Frost & Sullivan interacted were:

- Local Language IT Vendors in India
- Central and Various State Governments
- Research and Academia
- Industry Associations
- Publishing Houses
- System Integrators and solution implementers

Research Process / Methodology	Information to develop	Interview Contacts/Titles
Primary research interviews: n=33 interviews	Market Trends Adoption Trends Drivers & Restraints E-governance Initiatives Future Outlook	IT Secretary Marketing Vice Presidents Managers, Division Heads, Head of R & D Institutions

The detailed methodology for primary research phase has been outlined below:

Primary Interview Questionnaire Design

Frost & Sullivan developed a detailed questionnaire for each end user segment mentioned above, which was used by the analysts as a guide for their discussions for each of the phases of primary research. This process insured the collection of all necessary data.

The questionnaire is delineated at the concluding segment of this chapter.

Interview Questionnaire Test & Validation

Following design of the questionnaire, Frost & Sullivan executed some initial interviews to verify that the appropriate market data is generated. Final modifications were made to the research instruments to assure optimal project completion and success. For example, the questionnaire for IT Secretaries was tested with the IT Secretary in Mumbai.

Following final design of the questionnaire Frost & Sullivan began full-scale primary research.

Primary Research Implementation

Specific segments targeted for primary research interviews were selected based upon market participation. The higher the entity's profile, the more attractive the entity generally is. Specific individuals within selected targets were selected based upon existing Frost & Sullivan contacts, participant market role, title and area of expertise.

In this stage, Frost & Sullivan analysts observed that in terms of the value migration and dissemination, the market is very concentrated in nature from both the buyer and seller side.

Interview Process

As participants respond in the course of an interview Frost & Sullivan analysts are trained to move from lower priority and/or sensitive topics to increasingly key and/or sensitive topics in response to the interviewee's behavior. This responsive and reflective interview process, combined with the analysts' ability to discuss industry and technical issues in an open and sharing environment, allows Frost & Sullivan to penetrate often critical and proprietary issues while probing for key data, operations and competitive information. Multiple contacts within a single organization and with an individual are often planned and/or staged in order to optimize and complete the information gathering process.

Research Validation

At the point of the project where 20 percent of the research interviews and/or data collection has been completed Frost & Sullivan consulting evaluated results to assure that to-date results are in line with project objectives and time lines. This provides an early opportunity to make any necessary enhancements to assure research quality and results.

Processing, Collation and Analysis of Data

The team processed the information from the interviews for analysis. On-going tabulation and collation of interview results facilitated rapid valuation of data. Information and data was validated through a combination of the following:

- Cross checking with other primary data and previously developed in-house research; and
- Review of secondary information, such as trade journals and annual reports, and industry directories.

Management Review and Final Report

The project management team reviewed and analyzed the interview data and added its recommendations to the draft report. Having conducted published market studies and custom, proprietary research on various markets, the research management team added its perspective and years of experience to the analysis.

Strategic Review

Frost & Sullivan's Strategic Review Committee (SRC), composed of senior research and corporate management, reviewed the research strategies, findings and recommendations at key points throughout the project. This process is designed to ensure that 1) the project objectives are completely met, 2) the findings and recommendations provide the utmost strategic value to the client, and 3) the client's research investment is fully maximized.

Methodology for Market numbers and figures

Frost & Sullivan uses the Delphi method of estimation and forecasting of market numbers and figures. Through the in-depth interviews conducted with industry participants a consensus is reached over the market estimates. Forecasts are made using proprietary Market Engineering Methodology. Frost & Sullivan's proprietary reports and information from previous market studies are used to fine tune the estimations and forecasts.

The forecast methodology takes into consideration the present market maturity of a product or service, the market drivers and restraints and their short and long term impacts, specific initiatives (such as E-governance, Academia policies, etc), market competitors initiatives (R&D, marketing and sales strategy, education and awareness strategies etc) and end user adoption trends.

Database of Key Industry Participants

IT Secretary	
Shri Vivek Harinarain Secretary, Department Of Information Technology Government of Tamil Nadu	Smt Aruna Sundararajan Secretary - IT Government of Kerala
Shri Mukesh Khullar Secretary - IT Government of Maharashtra	Shri R Parasuram Secretary - IT Government Of Madhya Pradesh
Shri Rajesh Kishore Secretary – Science & Technology Government of Gujarat	Shri Williams Temple Nelapati Director Technical Information Technology & Communications Department Government of Andhra Pradesh
Shri D P Patra Secretary - IT Government Of West Bengal	Shri R Parasuram Secretary - IT Government Of Madhya Pradesh
Shri Nimaljit Singh Kalsi IT Secretary Government of Punjab	Dr. Bhagwan Sahai Development Commissioner, Industries Government of Maharashtra
Local Language IT Vendors	
Ms. Aparna Mani, Mr. R Hari IBM www.ibm.com/software/globalization	Mr Raveesh Gupta Microsoft Corporation (I) Pvt Ltd
Mr. Vinay Deshpande Encore Technologies	Shri R K Arora/Executive Director CDAC
Mr V N Shukla Director (Spl. Applns.) Electronics Research & Development Centre of India	Mr. Aniruddha Kaprekar Vice President ABM Knowledgeware
Mr M S Sridhar Jt Managing Director Cyberscape Multimedia Ltd	Dr M N Cooper Jt Managing Director Modular Infotech Pvt Ltd
Mr Pankaj Jain CTO Webduniya.Com (I) Ltd	Mr. Arindam Sengupta CEO Celcius Technologies Pvt. Ltd.
Mr N Anbarasan CEO Applesoft	Vakrangee Software Limited (VSL)

R & D and Academia	
Mr. Om Vikas Resource Centers for Indian Language Technology Solutions, Min of IT, Delhi (Language Tech Development in India)	Mr Durgesh D Rao Research Scientist – KBCS National Centre For Software Technology
Prof S Sadagopan Indian Instt. Of Information Technology	Prof Kalyanakrishnan IIT Madras
Language Technologies Research Centre International Institute of Information Technology - Hyderabad	Dr. Chaudhuri Computational Linguistics (LRU) ISI, Kolkotta
Prof. Anirudha Joshi, Human Computer Interface division Indian Institute of Technology – Bombay	Prof. Pushpak Bhattacharya CSE Dept of IIT --bombay Dept. of Computer Science and Engg. Indian Institute of Technology - Bombay
Mr. P V S Rao, advisor, Tata Infotech (CRSL)- Human Computer Interface Tata Institute of Fundamental Research	Ms. Ranjani Parthasarthi Anna University, Chennai
Industry Association	
Mr. Vinnie Mehta MAIT	

Annexure: Questionnaire for IT Secretary and Local Language IT Vendor

Questionnaire for Local Language IT Vendors

Business Demographics:

Respondents Name	Respondents Designation	
Name of the company	Tel No.	
Address	Industry	
Annual Sales (US \$ million)	2000	
Geographical presence	2001	
Employee strength	2002	

1. How, according to you, has the e-government or IT for the masses initiative in India evolved? What has been the path of evolution of local language applications in particular?

2. What, according to you, is the industry structure / market structure in the egovernment space? Where do local language applications fit in? How would you classify the different market players?

3. What, according to you, is the total size of this market? Please provide inputs by applications and by end-user segments.

4. Do you have a solution for the e-government space? Which sectors / areas does it cater to? (e.g.: Human Resource Development, Education, Administration, Health, etc.)

5. Which of the above are available in / compatible with local languages?

6. What are the different solutions (present) that you have in the following: (for local language applications or LLA)

Hardware: _____

Software: _____

Services: _____

Applications: _____

System Integration: _____

Consulting: _____

7. What is your product / solution offering plan for the next 2-3 years? (in LLA)

8. How many users do you have /implementations have you done in LLA?

9. What were the key factors that led the user organization to choose your IT product or technology solution? (Examples might be price, support, performance features, platform or application integration, user interface, e-commerce capabilities, and so on.)

10. How has your solution enhanced participation in community affairs and governance through creative use of information technology?

11. What is the implementation approach adopted by your company for the applications that you currently offer?

In-house / Tie-up with SI / Tie-up with VARs / Tie-up with Big 5

12. What is the typical revenue model you adopt for implementing e-government and local computing applications?

13. What is likely to be the revenue contribution as a percentage of total Application market in the country for the period 2001-2004?

Applications	Revenue contribution - As a % of the total enterprise application market.			
	Yr 2001	Yr 2002	Yr 2003	Yr 2004
OCR				
Text to Speech				
Machine Translation				
Generic Software				
Input-Output Layout				
Keyboard layout				
Others				
Others				
Others				
Total	100%	100%	100%	100%

14. What is the revenue contribution by type of services provided by your company?

Categories	Revenue contribution in (%)
Application licensing	
System integration	
Application service provider (ASP)	
Maintenance & upgrades	
Consulting & Services	
Training	
Others	
Total	

15. What is your revenue contribution by application categories?

Application categories	Revenue contribution (%)
OCR	
Text to Speech	
Machine Translation	
Generic Software	
Input-Output Layout	
Keyboard Layout	
Others	
Others	

16. What kinds of investments are required to be made by the user for implementing different applications?

Application categories	H/w spending (US \$)	S/w Spending (US \$)	Services Spending (US \$)
OCR			
Text to Speech			
Machine Translation			
Generic Software			
Input-Output Layout			
Keyboard Layout			
Others			
Others			

17. What, according to you, are the pricing trends in this market? By application / by end-user segment?

18. What, according to you, are the technology trends in this market?

19. What are your key distinguishing factors/core-competencies?

- ___ Software Application
- ___ Implementation services
- ___ Customization capability
- ___ Product features and functionality
- ___ User friendly packages
- ___ Well-defined technology road-map
- ___ After sales service
- ___ Training & Maintenance
- ___ Others (please specify)

20. Which attributes do you think would influence the decision of the end users while choosing the application provider or independent software vendor (ISV)? Rank the top 5 criteria. Please rank on a scale of 1-5, where 1 signifies low and 5 signifies high.

- ___ Brand Name Recognition

- ___Application Offerings (breadth & depth)
- ___Product Functionality and Feature
- ___Lack of in-house expertise
- ___Streamlining processes
- ___Ease of implementation
- ___Integration/Customization capability
- ___Service & Support
- ___Application Monitoring
- ___Price competitiveness
- ___Successful implementations/Reference sites
- ___Compatibility with other Applications
- ___Others

21. In order to ensure successful implementation what key issues need to be taken into consideration during: implementation, customization, consulting, training, etc.

Implementation _____

Customization _____

Consulting _____

Training _____

Others _____

22. What are the areas of pain that must be addressed for users implementing a LLA prior to the engagement of a solution provider?

23. What according to you are the restraints that are inhibiting the growth of the applications in the country? Rank on a scale of 1-5, where 1 signifies low and 5 signifies high.

- ___High cost of implementation
- ___ Unproven solution
- ___ Lack of transparency in process

- ___ Implementation time
- ___ Inadequate training and support
- ___ Insufficient application features and functionality's
- ___ Intangible Application returns
- ___ Others (please specify)

24. What according to you would act as the drivers and further provide a boost to the growth of the applications? Rank on a scale of 1-5, where 1 signifies low and 5 signifies high.

- ___ Available Product Feature and Functionality
- ___ Demand by customers
- ___ Expanding complexities
- ___ ROI
- ___ Compatibility with other Applications
- ___ Positive testimonials from early services adopters
- ___ Ease of operability and Integration
- ___ Global Trends
- ___ Other (specify)

25. What is the payback, or ROI, that customers can expect from a Local language solution deployment?

26. What are the success factors and best practices for customers, solution providers, and implementers?

Customers _____

Solution providers _____

Implementers _____

27. In your opinion what steps should the government take to accelerate the adoption of local language application in the country?

Questionnaire for IT Secretary/Other Government official

Demographics

Person being interviewed...	Designation
Ministry/Organisation/State	Tel No
Address	

Vision

1. What is the vision of your state for adoption and proliferation of information technology that is based on the vernacular language?
2. What are the forces that is driving this vision
 - ___ Self driven
 - ___ Driven by looking at the competition coming from other states
3. Has the state/department come along with a medium-term long term plan to meet these vision goals
4. What is the scope of the IT initiatives that your state is taking up
 - Government Centric
 - ___ Internal Government Administration
 - ___ Government to business relationships
 - ___ Government to citizen relationship
 - IT-as-a-change-agent centric
 - ___ Development of IT infrastructure
5. Which are the broad IT Initiatives that have been taken in your state during last 2 years under each of the classification above
6. Reality to vision gap.
7. Who is charged with the overall responsibility of implementing and managing the e-governance program in the state?

8. What are the changes that you envisage both in the internal functioning of the government as well as the external environment (such as citizen interactions)? What are the change management programmes (if any) that you have planned?
9. Are you measuring the impact of your Government centric and IT-as-a-change-agent centric initiatives on:
 - ___Internal Government working
 - ___Government and business relationships
 - ___Government and citizen relationships
10. What is the budget allocated for the proliferation of IT in the state?
11. What is the budget for e-governance initiatives and local language initiatives?
12. In how many years do you envisage the IT usage to increase and by how much? Please specify in terms of number of citizens using IT, increase in hardware penetration, increase in students studying IT in schools/colleges/private institutions, number of IT jobs, etc.

Evolution

13. What are the paths that you have taken for the evolution of vernacular language in your state?
14. What are the specific initiatives that your state / department has taken for the evolution of vernacular language in your state amongst the constituents:
 - ___Government Centric
 - ___Internal Government Administration
 - ___Government to business relationships
 - ___Government to citizen relationship
 - ___IT-as-a-change-agent centric
 - ___Development of IT infrastructure
15. Please check and provide numbers for the establishment of the following for spreading vernacular languages:
 - ___special institutions
 - ___special commissions
 - ___specialized units within departments, agencies

- ___e-government task force(s)
- ___non-governmental independent oversight
- ___e-envoy / ombudsmen
- ___others (please specify)

16. Government centric:

- What is the level of automation of internal processes of the different departments, interfacing the general public for providing information and services?
- If not fully automated, what is the likely time frame for complete automation?
Under 12 months _____ 1- 2 years_____ 2- 5 years_____ 5 + years _____
- Please answer for ascertaining the level of government automation in the state
 - ___How many ministries / department are on an *Intranet*?
 - ___Number of staff employed for IT related jobs in the ministries
 - ___Number of staff for proliferation of e-governance initiatives
 - ___How many servers and PCs is the government using
 - ___How many state government portals are there
 - ___How many are in local language
 - ___Hit rate of the local language portal
- Are any of the below areas of your e -governance program being outsourced (yes/no):
 - ___full network architecture and online service delivery development
 - ___website development
 - ___human resource training
 - ___transactions and collections
 - ___other

17. On of a scale of 1 - 5, with **1** being *extremely important* and **5** of *little importance*, rank the below challenges that may be impacting initiatives in local language and e-governance:

- ___limited availability of financial resources

- ___lack of technology / trained public sector IT staff
- ___internet access limitations
- ___absence of a coordinated government strategy
- ___citizen unresponsiveness
- ___lack of support from elected officials
- ___other (please specify)

18. Have many of the following actions (tactical) have been taken by the government to encourage increased citizen use of the internet for accessing government services?

- ___financial assistance to local governments for e-government activities
- ___government sponsored training programmes for the public
- ___national public information campaigns
- ___local citizen awareness programs
- ___public information kiosks
- ___community initiatives (Community Information Centers and Kiosks)
- ___meetings with panchayat representatives
- ___other: please specify

19. Are any of the below government special initiatives (strategic) being instituted to increase adoption of e-government and local language adoption among citizens?

- ___assistance programme for the less privilege
- ___awareness programme through the media to reach rural areas
- ___awareness programme to reach citizen with special needs
- ___awareness programme through educational institutions and programme
- ___financial assistance to local governments
- ___other: please specify

Channels

20. What are the channels used for deploying e-government initiatives?
21. What are the channels for deploying local language in IT initiatives?
22. Is the state being assisted by any other core agency for increasing proliferation?
23. What is the role of NGOs in proliferation of state government It initiatives?

Change

24. Are you measuring or auditing the impact of your Government centric and IT-as-a-change-agent centric on

___Internal Government working

___Government and business relationships

___Government and citizen relationships

25. Is the measurement of impact or auditing happening through statutory means or through external means including non-government organizations?

26. What are the specific policies that your state/department has adopted and is likely to adopt so as to bring about smoother adoption of IT amongst the constituents

___Internal Government employees

___Citizen

Urban

Rural

___Businesses

General Section

27. Is the number of nodes for interaction provided by government sufficient?
28. Is the suggestion of citizens given a hearing?
29. Is the information of government agencies easily accessible to all?
30. Do the government agencies work as a single unit and is the information available to one agency is available to others agency as well?

31. Are all the online services integrated?
32. Reach of the government to the public - How many offices are there for public delivery and per office how many officers?
33. Does the government, before making budgets, consider suggestions of Business houses, NGOs and Citizens?
34. Are the rules for online access and payments in place?
35. Are there stringent laws for the breaking cyber laws?
36. What are the steps taken to inform new laws to the citizens?
37. Do you gather regular feedback on the services offered by the government?
38. What are the outcomes sought by citizens?

Appendix

E-governance initiatives in States

Maharashtra

The Government of Maharashtra is considered on a medium scale of advancement on e-governance deployment.

- Realizing the importance of Information Technology in the progress of the state, the Government of Maharashtra started a project of connecting 3,000 government offices through a network. It now plans to extend this network to the 'sub-taluka' level. The government has set up a district Wide Area Network (WAN) to interconnect 3,000 districts in the state.
- The Stamps and Registration Department has shown the need to upgrade the infrastructure and it is engaged presently in the computerization of the department. This is accompanied by imparting the necessary training to its staff.
- The State Excise Department has retained the Computer Maintenance Corporation (CMC) for developing a software package for its operations. CMC has also accepted the responsibility of training the employees of the department.
- Various Government departments are on the road to getting computerized. Some of them have already started using word-processors in Marathi. The Center for Development of Advanced Computing (CDAC) is providing them the support required for the use of the devnagari script. The Government is trying to make menus and front ends in Marathi only. All the language (Marathi) related software uses ISM 3.04 font provided by CDAC. For devnagari interface plug-ins are not available on the Internet. CDAC again is trying to find a solution to this problem.
- Land records in the state are electronically maintained, and in Marathi only. Form “sat-bara”, as it is called for land records, is planned to be made available through computers at taluka level. Data capturing is going to be done mainly in Marathi. The State Government has made Marathi a compulsory language for any form of formal communication and paper work. The government has decided that it shall make familiarity with IT and computer usage compulsory to enter government services.

- Computerization and office automation is slowly reaching the Zilla Parishads and Collectorates. The Government has provided a front-end called “setu” at talukas, collectorates, etc. in the local language, which is Marathi. It can be used for tasks like registry, lodging a complaint, etc. Front-desks, kiosks, web sites, telephones, helpdesks—the Government intends to provide support to all these only in Marathi. These “setus” are set up on Build Operate and Transfer basis to promote local ownership enterprises.
- The Government of Maharashtra has its own bilingual website (Marathi-English) for citizen reference and interaction, www.maharashtra.gov.in. The web site has a strike rate of approximately 7000 hits per day. The information entered in Marathi on the site for the non-English speaking section of the populace. The web-site has no provision of translating from English to Marathi and versa. The government has its own Intranet called “Mahanet” working with Very Small Aperture Terminals (VSATs). The Mantralaya is thus connected to the districts, and further to the talukas. The state is also considering the idea of establishing data centers to be able to store the data from all the departments at a common location.
- A sum of about Rs. 14.5 Crores is planned to be invested for the setting up of computer labs in 637 government/semi-government secondary and higher secondary schools in the next five years, as proposed in the IT Policy of the Government of Maharashtra. Also, wherever possible, Internet connection shall be provided.
- Over the future period of three years, the government plans to automate and provide local language support to the Sales Tax and Excise departments. Work on the water supply and housing departments is in progress, while the agricultural department is already computerized.
- Transportation department is also likely to adopt IT support for processes such as licensing, providing permits for travel buses, taxis, autos, etc. through regional offices.
- At present, the use of technology or computers in the Government is only for information extraction, but transaction based processes are in the pipeline.
- An annual investment of 3 percent of the state budget is allocated to adoption of IT by government. However that has not been utilized so. About Rs. 10.6 Crores has been finally assigned for the current year 2002 and almost Rs. 108.8 Crores has been spent over last four years.
- The State Government plans to facilitate hardware penetration based on the demand. The target initially is 50 percent of the urban and semi-urban population, especially in sugar-belt areas. This is because these people shall find it economically affordable.

- It is required to train people to use computers and avail of the local language support. The Government has planned extensive and wide scale training for people from different age groups and different professions. The private sector companies are also showing active involvement in the venture. The Tata Consultancy services (TCS) is integral to initiatives in adult literacy. IBM and Microsoft have started training programmes and certificate courses for teachers.

Madhya Pradesh

Madhya Pradesh State Government has lead the e-Governance initiatives that are bringing transformation at the grass roots level.

- The State aims at contributing 5 percent to 10 percent of the IT revenues of the State) by the year 2008. This would translate into employment opportunities for between four hundred thousand to one million persons in IT related activities.
- The Government has set up a body “Madhya Pradesh Agency for Promotion of Information Technology” (“MAP_IT”) to give a thrust to the IT penetration in the state, and to ensure that the state keeps up to the plan of action.
- Hindi shall be encouraged as the language to be used to maintain the electronic databases and applications. Hindi e-mail shall be used for communication between the Government Departments and officers. Also, steps shall be taken to ensure that all hardware or software developed in the state has bilingual support.
- Every department of the Government will have a sub-plan for IT usage in the department included in its annual plan. Each Department shall be required to be equipped with a senior staff, with IT knowledge. Also there will be a separate head of accounts for IT activities from this budget onwards.
- All the district and sub-district level offices are to be automated by the end of the year 2003.
- E-mail facility will be provided to all Government employees to facilitate quick and easy interaction.
- Every department, District Government office, the Collectorate and the Zila Panchayats are going to establish a LAN by the year 2003.
- The following systems facilitating e-governance are likely to be established:
 - Information system for the agricultural market information.

- The Treasury Accounting Information System
- The Commercial Taxes Information System
- The databases under the DISNIC-PLAN, Village Information System, and Gram Sampark Abhiyan
- The Transport Management System

The government plans to merge all e-governance initiatives in the state into one, under a single head, called “Gyandham”.

Some of the successful e-governance initiatives of Madhya Pradesh Government are:

- Gyandoot: It is the best e-governance success story in Madhya Pradesh. The project is a very economical intranet in Dhar district of Madhya Pradesh that connects rural cyber cafes. ‘Soochanalayas’ distribute information related to news pertaining to the local, neighboring districts/villages, prices of agricultural produce, records and information about their land, caste/birth/death certificates, etc. The project is being extended in 10 more districts.
- Computerization of Land records: Land records are computerized in 55677 out of 55897 villages and farmers here are provided with computerized documents. The “Tehsils” are also equipped with the necessary hardware for the same purpose. Data regarding agriculture, weather, crops, rainfall, cattle census, minor irrigation projects, statements of land settlement, tables of land inspection works for scrutiny, etc. are digitally stored. It is estimated that about 3.75 lakh computerized copies of the Government document “khasra” were provided by the end of 2001-2002.

Gujarat

- The government recognizes the need of connectivity between departments and districts for effective e-governance. So a network was planned to connect the State headquarter to the taluka level.
- G2C initiatives will be given priority for effective delivery of Government services. Hence, computerization will begin in key areas, like the issuance of ration card or driving license, etc.
- One percent of the State Government budget would be committed to IT related activities, which is expected to rise to 3 percent by 2005. Facilities such as e-mail for quick communication and document imaging system for reduction of paper work are to be made available for Government to citizen interactions.

- The use of IT in education will be promoted.
- Promotion of Gujarati on computer. This would be achieved by setting up of dedicated time bound projects, which would develop suitable technologies to enable greater usage of Gujarati on computer. Most of the e-government initiatives in Gujarat provide support in two languages, English and Gujarati.
- Gujarat State Wide Area Network (GSWAN): The Government of Gujarat has set up a state-wide, IP-based, end-to-end network to bring about connectivity between the various government offices and corporations all over the state. The head quarters at Gandhinagar are connected to the districts and talukas in the state, 25 districts head quarters, 174 other district level Government offices, and 202 Talukas are interconnected within the GSWAN. Also, 23 more talukas are likely to be a part of the network as soon as leased lines are available. The network possesses the capability to provide quick transfer of voice, data, and video across the state. It can integrate with any other LAN network in the state. Fourteen departments in the government have put their web sites on GSWAN. Some representative G2C applications introduced are:
 - Chief Minister's call center for solving problems of citizens
 - Employment information system
 - Judiciary with reports about the court cases in the districts
 - Updates on engineering and medical college admissions, etc.
- Sachivalaya Integrated Communication Network (SICN): SICN is another network with fibre optic links to connect all government offices at Gandhinagar, making possible rapid exchange of voice, data as well as video.
- Computerized Check Posts: Each of the 22 Regional Transport Offices (RTOs) of State Road Transport Department be computerized for issuance of driving licenses.
- Vadodara Model District Project: The project is aimed at software development and training of the entire staff, and connected 64 nodes in the Collectorate with 13 nodes in as many block towns in the state.
- Electronic Data-warehouse: The Department of IT is creating a central electronic repository for information about all the issues and activities of the State Government. This will facilitate easy information exchange. The system will facilitate anytime, anywhere access to the data.
- The Citizen Card Project: As part of this project smart cards for citizen identity will be issued. It will be initiated as a pilot in one or two locations.

- Dairy Sector: The project aims at a cost-effective solution to increase the efficiency of the dairy sector by automating its activities, and providing services.

Some other e-governance projects that have taken shape include computerized land records (in English and Gujarati), e-seva, computerization of the Department of Treasuries, various government web sites like www.talimrojgar.org, www.mahitishakti.net, etc.

West Bengal

- The Government is building an integrated State-wide delivery backbone for a WAN for e-Governance, e-Commerce, distant education, and provide efficient government–citizen interface. Optical fiber links and VSAT systems are to be installed to form a strong communication backbone.
- West Bengal Electronics Industry Development Corporation Limited (Webel) shall be to act as a facilitator for e-governance initiatives in the State.
- West Bengal State Wide Area Network (WBSWAN) aims at connecting eight towns in the state and provide e-governance services, distance learning, etc. The departments will initiate connectivity of district offices to the district magistrate’s office, to enable transfer of information between the two. The official government web-site www.westbengal.gov.in is regularly updated to accommodate all the information on important government issues for citizens, in both English and Bengali. Various Government forms are available online for citizen access.
- Budgeting process in the Finance Department has been automated. Major revenue collection offices of the Commercial Tax Directorate have been computerized.
- In the Transport department, a number of Motor Vehicle Offices have automated some of their functions such as registration, tax collections, issue of permit, etc. Smart Cards are likely to be introduced for registration certificates and driving licenses.
- Land and Land Reforms Department: Of the 341 Blocks in the state, 331 have computerized land records. Land Acquisition Information System is used as a pilot system at the New Kolkata Township Project. The system makes the processes of producing various reports such as announcing a new land acquisition, preparing various land related estimates, declaration of land related schedule, etc. very quick and reliable.
- Computerization in other Departments: The Labour Department, Information and Cultural Affairs Department and Home Department are also following suit to automate themselves. Around 37 out of 71 Employment Exchanges under the Directorate of Employment perform their operations in a

computerized environment. A digitized database of the cultural activities in the state is maintained at the Kolkata information centre. In association with the Regional Computer Centre and Webel, the Information and Cultural Affairs Department has set up two kiosks for citizens to access the information, with supporting facilities of e-mail, Internet, etc. The home department has taken up task of bringing all the networks in the various state departments under one main network. Among the achievements of the police department is the computerization of the Police Control Room in Bidhannagar, and that of the Detective Department of Kolkatta police.

- Public Grievance Redressal system has been implemented in a few district offices across the state. It is planned to connect all the existing systems in a single network to make the system more efficient and quick in delivering its services.
- Government Portal: A bilingual government portal to facilitate efficient government to citizen interaction has been setup. The portal will provide access to information about the various government departments and will allow some forms to be downloaded.
- Geographical Information Systems (GIS): The Municipalities of the state have been working toward the goal of automating the Geographical Information Systems. 71 municipalities of 122 are covered.

Karnataka

- Khajane: Department of Treasuries completed the installation of 250 VSATs to keep a track of every single transaction at all district and taluk treasuries. This system serves 4.7 lakh pensioners of Government service, art and culture, sportsmen, journalists, freedom fighters, etc., and 13.15 lakh old age pensioners, the physically handicapped and needy widows.
- Mukhya Vahini: Though most decisions are taken at the village and district levels, the government recognizes the need of an extensive database at a single point to which all the decision makers in Karnataka can have an access.
- Bhoomi: This project refers to the land records of all the villages in Karnataka, which are already computerized, and are to be made available to the villagers through state owned kiosks.
- Nondani: This is a scheme to make land registration convenient for the citizens. Some sub-registrar offices have facilities to examine the registration actions and return the registered documents. So far, over 100,000 documents have been registered in this way. The process of feeding 13-year data into the computer, which is necessary to provide the registrations and certificates, is nearing completion.

- **Therige:** Various sub-departments in the Commercial Taxes Department are computerized. The details of about one lakh dealers are stored in the computer. Presently, computerization of important check-posts is underway. These computers shall scan the statements and provide the details of the transactions to the assessing officers to check evasion of taxes on certain commodities.
- **Karnataka Government Insurance Department (KGID):** Karnataka's insurance department provides both life insurance and vehicle insurance. The vehicle insurance part of the department is fully computerized, while computerization of life insurance sector is under progress.
- **Reshme:** Under this scheme, the Karnataka Government has introduced online transactions in the silk market.
- **Agricultural Price Information:** The current prices of agricultural commodities can be registered and displayed at APMC, Bangalore. The Government of Karnataka now plans to expand this existing system to other APMCs to make the prices of the agricultural products easily accessible to all the farmers across the state.
- **Employment Department:** The Government of Karnataka is maintaining computerized data on registration of candidates for employment, employment market information, etc.
- **Police:** Police division of the state has started using a computer network to help the department better organize its activities.
- **Saarige:** This is the government's endeavor to automate all the Regional Transport Offices (RTOs) in Bangalore, with an aim to issue quick driving licenses to the citizens. Another benefit expected is simplification of the process of vehicle registration.
- **Municipal Corporation:** The Corporations at Bangalore, Mangalore, Mysore, Belgaum, Hubli-Dharwad, and Gulbarga are being computerized. The venture is to make easy the payment of property tax, issue of birth and death certificates on time and grievance redressal.
- **Environment:** The Forest Department has already implemented computerized systems to track poaching and other forest offences, record the amount of land use, improve the wild life management system and nurture rare species.
- **Small Scale Industries:** Over 2.5 lakh Small Scale Industries are registered permanently under computerized environment. Computers have reached all the districts as well as 26 taluk industries centers in the state.

- Launching of an information network to connect all the district and taluk head quarters is planned. Presently, all the districts and 140 out of 175 taluks have been connected through a Fiber Optic Network.

Kerala

- Registration Department: The project has kick-started with the aim of automating the offices of five sub-registrars. One such model installed in the Office of the Controller of Entrance Examinations, allows on-line admissions to about 25 colleges.
- RD net: RD net, a dial-up computer network, has been set up in Kerala with an aim to interconnect all the sub-districts/blocks in the state. 152 development blocks have been successfully connected, with each of these having an e-mail address of its own for quick correspondence.
- Department of Treasuries: As a part of the first phase, five of the sub-treasuries have interconnected in Thiruvananthapuram. The second phase will now test the viability of VSAT networks for this interconnection.
- Banking: National Informatics Center (NIC) and the Institute of Co-operative Management are assisting the government in connecting the co-operative banks in the state.
- Secretariat Wide Area Network to connect offices of all ministers, secretaries, Heads of Departments, etc. is likely to be setup. An online enquiry counter will be made available through which the status of all the petitions or lawsuits could be retrieved by the user. This network could help the citizens to easily verify the current position of various files and law cases from anywhere in the state.
- Bilingual Web-Portal: The Government of Kerala has its own web-portal, with bilingual support in Malayalam and English, which provides a link to information about the various departments of the state. The state plans to make it citizen centric by placing information and various application forms online. A facility to send e-mails to ministers, with an assurance of timely responses is already in place.
- The Information Kerala Project: The aim is to reorganize the administration of the panchayats by creating packages for automating various activities such as issuing licenses, payment of taxes, etc. This project will support payment of various welfare pensions, maintenance of a database of their recipients, or the ones related to the administration of the panchayats, like maintaining a set of rules, acts, government orders, court directions etc.

- **Fast Reliable Instantaneous Delivery of Services (FRIENDS): Janaseva Kendram:** This project is aimed at making Government to citizen transactions convenient and timely for citizens. FRIENDS center offers services like payment of Property Tax, Professional tax, Building Tax, revenue recovery, fees for licenses and permits from motor vehicles department, Kerala University Exam Fees, etc.

Uttar Pradesh

- **Treasuries Department:**
- **Integrated Treasury System Application of NIC (ITSANIC)** is automating the department of treasuries at 90 locations in Uttar Pradesh. The services offered by this system include online voucher acceptance and verification, checking of budget classification, bill passing, unit level budget checking, online cheque printing, accounts preparation, etc. The department maintains a web site to provide the citizens an easy access to the data.
- **Transport Department:** The RTO at Lucknow is computerized. The Government plans to replicate the system at twenty-five other locations in the state. The system offers various services like vehicle registration, taxation, issuing permits, etc.
- **Computerization of Land Records:** The land records have been computerized at Etawah district. "Record of Right" and village map are likely to be integrated with this system.
- **Pensioners Information System:** This system uses a software package that maintains a database of all the pension-receiving citizens in the state.
- **Lucknow Nagar Nigam:** Lucknow Nagar Nigam (Municipal Corporation) is a pilot project undertaken by NIC Uttar Pradesh. The project plans to create an extensive database of the houses under the purview of the Municipal Corporation, tax liabilities due to the corporation and defaulters, deaths and births registrations, generation of instantaneous reports, etc. Some services on the system are likely available through the Internet.
- **Land Registry:** The land registry system will be tested in five districts before finalizing the plans of its implementation.
- **Grievance Monitoring System:** NIC has installed a system at various locations in Uttar Pradesh where citizens can register their grievances. Software for file tracking is used with the system at all the centers.

- District Statistical Handbook (Sankhiyikiya Patrika): A vast database covering data on various economic parameters is maintained for the various districts in the state.
- Web Services: The Government of Uttar Pradesh has an official website for all the 114 departments and 70 districts in the state. Presently, 108 web sites belonging to 30 Government departments, 64 districts, and 14 other departments or corporations have been made online.
- Other e-Governance Projects in Uttar Pradesh include Passport Offices at Bareilly & Lucknow, Registrar of Companies at Kanpur, Central Excise Offices at Meerut, Kanpur, Lucknow & Allahabad, High Court at Allahabad & its Lucknow bench, Postal Life Insurance (PLI) for the Department of Posts and Press Information Bureau.

Rajasthan

- The state of Rajasthan is evolving slowly in the area of e-governance. Some of the initiatives taken by the Rajasthan State Government for facilitating IT penetration in the government offices are:
- Vikas Darpan: This is a Decision Support Database System for recording and maintaining the Geographical Information Systems (GIS) related data. It maintains data on around 200 socio-economic parameters of 40000 tehsils in the state.
- RajSWIFT: RajSWIFT is a state-wide intranet in Rajasthan, and is maintained by the IT Department. It uses the Internet to facilitate access of online data, and for correspondence between the office of the Chief Minister and those of 32 District Collectors.
- RajNIDHI is a web-enabled kiosk for facilitating effective Government to citizen interaction. The system causes efficient dissemination of information, and allows governance to be more responsive to the needs of the citizens.

Some of the planned initiatives include:

- Chief Minister's Information System to be able to oversee and keep a track of the advancements in the important activities in the state.
- Interconnecting over thousand rooms in the secretariat in a local network.
- The Government plans to incorporate a transparent system of governance. The projects undertaken with this aim in mind are:

- ‘Aarakshi’: The system provides the concerned officers with online information on criminals.
- The Ajmer Collectorate is to be automated, and provided with facilities like a system for grievance redressal
- Computerization of hospitals
- Computerization of the Registration and Stamps Department

Tamil Nadu

- E-governance ranks high on the state’s agenda.
- STAR Project: Simplified and Transparent Administration of Registrations (STAR) is a project undertaken by the Registration Department of the Tamil Nadu Government to automate the registration process. The software for the same has been developed by NIC with help from the registration department employees. It is being updated regularly to improve its functionality and increase its processing speed. The data regarding all the registrations in the past 13 years has already been fed into the system.
- Registration Network (REGINET): REGINET is a network connecting all the offices of the registration department of Tamil Nadu. The system has been deployed in 125 offices, 100 of which are successfully using the service. The system will be extended very soon to the remaining sub registrar offices. The IT services provided by the REGINET centre include property valuation statements and encumbrance certificates of any property within Chennai, issue of certified copies of documents, etc.
- The Tamil Nadu Government has taken some more small steps toward increasing IT penetration in Tamil language in the state. The Tamil Internet Research Centre has been providing funds to encourage projects using Tamil on the Internet. This is done with a view to allow maximum number of citizens to avail of the Internet facility and access the information on it.

Andhra Pradesh

- Andhra Pradesh State Wide Area Network (APSWAN): This state-wide network allows effective government-citizen and government-industry interactions. The plan now is to extend the network and make it available in the remaining towns, all “mandal” headquarters, and then to all villages in a phased manner.

- **TWINS:** TWINS project aims at delivering key citizen services from a single convenient location, with the help of machines located at integrated citizen service centres (ICSCs). The machine would also supply the citizens with important information on the Departments of the State and Central Governments. The services included payment of bills (electricity bills, water and sewage bills, etc.), payment of taxes, registration, issuing birth and death certificates, etc.
- **E-seva:** TWINS Project extended to other towns and municipal corporations has been renamed E-seva. E-seva centers offer a variety of citizen-centric services at a single location, thus, reducing the effort on the part of citizens. 21 eSeva centers (with 200 service counters) are installed across the twin cities.
- **CARD:** Computer-Aided Administration of Registration Department (CARD) is an initiative taken by Registration & Stamps Department. It provides a solution to computerize the registration process, for convenience in registration as well as to save time. The project has been implemented at the offices of 239 sub-registrars in the state. More than 3 million documents have been registered in electronic form by June 2002 under the CARD system.
- **FAST:** Fully Automated System for Transport (FAST) interconnects 37 Regional Transport Offices (RTOS) and provides automation for services such as issue of learner's licenses, driving licenses, and registration of vehicles, collection of motor vehicle taxes, etc. The project also aims to maintain an extensive database of transport related information. The interconnectivity is provided through the APSWAN.
- **Secretariat Knowledge Information Management System:** This is the Government's initiative to automate the operations in the Secretariat. It also provides tools for keeping track of the processes, and assesses them for their performance.
- **Geographical Information System (GIS):** A GIS has been installed to collect the geographical data such as road networks and community infrastructure. Remote sensing satellites are used for observations and generation of the data.

Punjab

- Punjab is preparing and setting out to develop a strong infrastructure base to implement e-governance. The "public private partnership model" is being encouraged for the same. The definition of procedures for implementation of e-governance, and priority areas within the same are being established.

- The Government plans to implement the Punjab State Wide Area Network to interconnect the various departments and to maintain a common database at a common place.
- The Government is taking active steps to define department-wise Strategic IT Action Plans (SITAP) clearly indicating objectives, goals, and priorities.
- The portal punjabsewa.gov.in offers almost 300 services to citizens.
- The Government plans to implement privately managed IT kiosks for information access at the grass roots level. The State also plans to install data base servers and application servers, for the respective departments. A data-center consisting of the database and application servers will also be set up, to be shared by all government departments and bodies.
- Every Government to citizen transaction requires citizen identity and related data. The government plans to create databases for identity of citizens, their property database, and their business database. Followed by this would be steps to establish the databases for the State Electricity Board, old age pensions, food and civil supplies or transport. Among these the business database in the form of master dealer files (MDF) is already organized with the department of excise and taxation. The citizen's database is expected to take some more time.
- The Government has selected the Fatehgarh Sahib district to implement a pilot project for providing the government services to the citizens with the help of IT. The system shall provide 24 hour online services to the citizens. To put the required citizen, property, and business databases for this project in place, the Government has already started a door-to-door survey.

The most common and vital point in most of the above government initiatives across various states has been the usage of local language in making e-governance a success. The computerization of majority of the departments that would be integrated with the e-governance initiatives necessitates the use of local language software. E-governance and local language software thus go hand in hand.