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SYSTEM CONCEPTUALIZATION FOR IT POLICY AT INDUSTRY LEVEL

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ABSTRACT

Information Technology (IT) industry of India is today a respectable member of the global economy having been universally acknowledged as strategic tool for development. It is an invisible thread passing through all the functional areas of complex business activities. Further, it has drawn the attention as being one of the progressive industries and a key contributor to the national economy especially during the last decade or so. Looking at the huge potential in the IT sector in the early 1990s, many small, medium, and big firms in India started software business, but because of lack of systematic strategies and low ability to cope up with the dynamic market behavior, some of them either closed down or went into red. There are many questions that concern the top management of the firms, academicians, researchers and policy makers. How is the progress of India in global market in software industry? Why India is not No.1 in the global software market? What are the existing policies in IT industry in India that influence its growth? Whether any flexibility in the policies will help India for its growth? How can software firms adapt the flexible strategies to contribute to India's growth? In order to discuss various issues coming out of the questions, an in-depth analysis of the software and services industry, which is an emerging and major industry in the Information Technology area in India, is required. And for this, a detail discussion about the IT software and services industry is carried out here at the conceptual level.

Keywords: IT Policy, Software and Services Industry

Introduction

Information Technology (IT) industry of India is today a respectable member of the global economy having been universally acknowledged as strategic tool for development. It is an invisible thread passing through all the functional areas of complex business activities. Further, it has drawn the attention as being one of the progressive industries and a key contributor to the national economy especially during the last decade or so.

Looking at the huge potential in the IT sector in the early 1990s, many small, medium, and big firms in India started software business, but because of lack of systematic strategies and low ability to cope up with the dynamic market behavior, some of them either closed down or went into red. There are many questions that concern the top management of the firms, academicians, researchers and policy makers. How is the progress of India in global market in software industry? Why India is not No.1 in the global software market? What are the existing policies in IT industry in India that influence its growth? Whether any flexibility in the policies will help India for its growth? How can software firms adapt the flexible strategies to contribute to India's growth? In order to discuss various issues coming out of the questions, an analysis of

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the software and services industry, an emerging and major industry, in India has been done here.

Table 1: Global Software and Services Market Size in US$ billion and India's Share (per cent)–Detailed Picture

S. No.	Segment	Global Market Size (India's Share) 2000	Global market Size (India's Share) 2008
1	Custom application development	18 (2.50)	20-25 (7.9)
2	Application outsourcing	11 (1.70)	20-25 (7.1)
3	Packaged software installation and support	41 (0.30)	100-120 (5.0)
4	System integration	72 (0.15)	155-190 (3.7)
5	IS outsourcing	19 (0.05)	100-125 (2.5)
6	Network infrastructure management	20 (0.05)	45-60 (1.1)
7	IT training and education	56 (0)	45-50 (1.1)
8	Network training and integration	22 (0)	45-55 (0.3)
9	Hardware installation and support	43 (0)	40-45 (0.2)
10	IT consulting	18 (0)	30-35 (0.5)
	Total	320 (4.75)	600-730 (29)
	India's global share	1.5 per cent	4.1–4.7 per cent

Source: Nasscom, 1999

The Software and Services Industry in India

The IT industry in India started in the 1960s, when the govt. of India emphasized on the need for increasing efficiency of govt. offices viz. banks. But the major thrust started in the 1980s with initiatives by the central govt., computer policy formulation, opening up of computer courses in colleges and formation of major firms. The ability to conceptualize, implement and migrate ERP applications, the demonstration of capabilities in embedded systems, new product development and enhancements and newly emerging capabilities in technology have all contributed to building reputation of the software firms in India. The solution to the Y2K problem shows the capabilities of the Indian software firms and prove their worthiness. Information Technology became so wide spread that people wanted to have the information at any time. In the process, the IT act was formulated in 2000. The chronological variation in the growth of the Software industry in India is depicted in Figure 1.

In the last five years of the twentieth century (1995-2000), the Indian IT industry has recorded a CAGR (Compounded Annual Growth rate) of more than forty per cent, which is much higher than the growth rate of IT industries in many developed countries. Software continues to contribute a major portion of the Indian IT industry's revenues. More than 185 of the fortune 500 companies outsource their software requirements to Indian Software firms. Large number of people of Indian origin are working in many global IT firms e.g 23 per cent of Microsoft, 21 per cent of Intel, 19 per cent of IBM and 18 per cent of Oracle's workforce are people of Indian origin. Moreover, leaders of many global firms around the world are setting up their offices or scaling up their capacity in India. In India, IT spending as a per centage of the GDP in 2001 was about 1.68 per cent. In the US, however, the IT spending as a per centage of GDP is more than 6 per cent. With govt. of India's resolve to increase IT spending, it is forecasted that by 2008, IT spending in India could touch 3 per cent of its GDP.

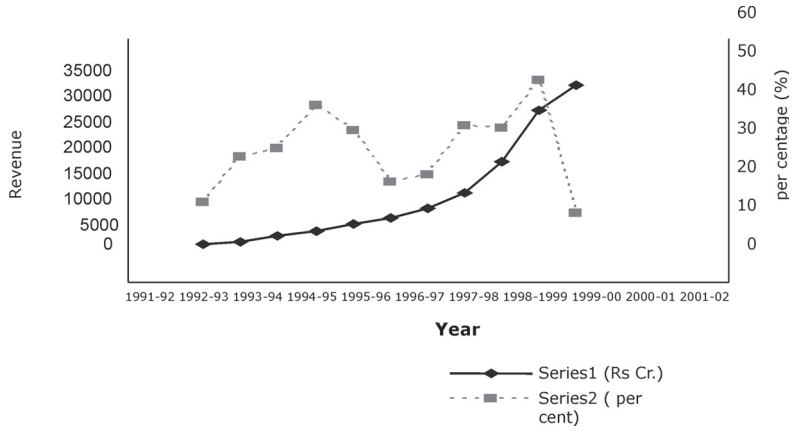

Figure 1: Growth of the Software Industry in India from 1992-2002

Source: DQ, 2002

The software and services segment accounts for almost sixty per cent of the industry's revenue in year 2002. The software services exports has been growing at a rate of 19 per cent ($6.2 billion) whereas the IT enabled services has been growing at a rate of 73 per cent although with smaller base ($1.5 billion) (2002–03) despite slowdown in the global economy (Table 2).

Table 2: Overall IT Segmentation in India

	2001-02 Value (Rs. Cr.)	2001-02 Total (per cent)	2000-01 Value (Rs. Cr.)	2000-01 Total (per cent)	1999-00 Value (Rs. Cr.)	1999-00 Total (per cent)
Systems	9295	15	10058	18.4	6234	19
Peripherals	2794	4	2636	4.8	2070	6
Networking	2235	4	2023	3.7	1234	4
Packaged Software	1900	3	1944	3.6	1620	5
Maintenance	1830	3	1578	2.9	1182	4
Training	1467	2	2329	4.3	1561	5
Domestic Services	4767	8	3978	7.3	2947	9
Others	0	0	123	0.2	154	0
Exports	37846	61	29896	54.8	16050	49
Total	62134		54566		33052	

Source: (DQ, 2002)

The overall IT segmentation in India reveals that exports contribute to maximum (around 61 per cent), followed by systems and domestic market with a contribution of 15 per cent and 8 per cent respectively, to the total output of the industry.

Characteristics of the IT Industry

The IT industry is best characterized for its fast changing nature of technology. The rate of change of this technology during the last four decade is really noteworthy. Characteristics of an industry can have major impact on the dynamics of its growth. The IT industry characteristics is unique in regards to its hardware, software, networking and IT-enabled services.

Some of the characteristics of the IT industry in general are:

- Rapid change in hardware, software and networking technology.
- Wide acceptability and orientation of computer technology in organization and individual life.
- Miniaturizations of hardware components, attaining the high speed and capacity, and high processing capability.
- Integration of computer technology with cable TV, cellular phone and other house hold appliances.
- A gradual shift from hardware and software segments to e-businesses and IT-enabled services.

India is quietly but quickly emerging as the leader in the field of software engineering and web-based services. The key features of the Indian software Industry have been rapid growth, manpower and skill intensive, adopting rapidly changing technology, project management and infrastructure development. The strengths of firms in India include the country's decade old experience in this area, fluency in English, supportive govt. policy infrastructure and high quality. Followings are some of the characteristics of the software industry in particular:

- *Low cost*: Much of India's strength growth in software in the past is attributable to the low cost of Indian Programmers. Indian Programmers are paid about 15-20 per cent of his/her counterpart in developed nations. Even among competing countries Indian software professionals were paid the least. This has provided domestic software firms a cutting edge in pricing for software projects. However, this low cost edge cannot be considered as long-term growth advantage. But what ever it may be, India continues to offer significantly in quality in comparison with the cost involved in it.
- *High on learning curve*: Indian companies have over the last decade built expertise on a variety of platforms – from legacy systems to the latest state-of-the-art systems.
- *Wide gamut of services*: India's advantage has been that it could offer a wide range of software services from clerical support/ data processing to sophisticated software systems. The low cost and easy availability of manpower at all levels enabled it to offer labor intensive support services, while the technically qualified and skilled personnel enabled it to offer quality solutions involving sophisticated software systems.
- *Project management skills*: Indian companies have a rich experience of working with large global software firms. The forced subcontracting of large Y2K projects has also provided Indian companies with substantial experience in handling and executing large sized projects.
- *Manpower*: There is a tremendous latent potential of manpower supply in India. India has the second largest pool of technically qualified English speaking manpower (second one to the United States) available at a comparatively lower cost. Demand for manpower continues to surge. India has the capacity to supply thousands of software professionals each year, which hardly meets the global demand. Indian software industry can therefore continue to have a manpower led growth.
- *Infrastructure facilities*: India has more than one thousand five hundred high speed communication links of 32-256 kbps, connecting Indian software companies with their clients' abroad. A majority of the infrastructure and communication links are provided by Software Technology Parks of India (STPI).
- *Conducive regulatory framework*: Software industry has enjoyed virtually unbridled liberty

to conduct its business in the best possible manner. Government has also encouraged the industry by providing tax benefits to exporters like tax holidays for a specified number of years.

- *Quality aspects*: Software companies in India improved their quality tremendously in the last few years. Today firms are known for the quality of their software services. India has a very large number of quality certified software companies in the world.

IT-enabled services are about empowering organizations to meet information and support needs of internal and external customers with no regard to time, place and regional characteristics. The complete gamut of IT-enabled services include online information and help support through call centers; relationship management; back office data processing and providing useful information to executives at fingertips; and providing easy access to information points. IT-enabled services have been referred to as the next major driver of technology-led services industry. The reasons attributed are:

- Lowering of cost of information access, increasing service orientation of world-class organizations, need to automate customer support with maximum satisfaction and minimum error levels, improvement in communication infrastructure enabling transparent routing of transactions across borders and outsourcing of non-core competency services.

More than 80 per cent of the world's top firms rely on communication-based services and consider such resource centers as integral to their customer service strategies. Globally, IT-enabled services such as Back office management, transcription and content development is emerging as a US$ 75 billion industry, growing at a rate more than 20 per cent annually.

The spectrum of IT-enabled services includes the following broad segments:

- Call centers, medical transcription, back office operations, revenue accounting, other ancillary operations, insurance claims processing, legal databases, development, payroll and logistics management.

Service sector includes hardware services, software services and education services. The statistics indicates a higher demand for services that cover e-commerce, networking, mail access, web applications, CRM, data warehousing, tele-computing and ERP. A look in the industry components in 2002-03 indicates the high dominance of domestic software and services (Rs. 13,372 crores) and further it has been increased and became Rs. 15,350 crores in 2003-04. This indicates a growing dominance of services in the IT industry.

The IT Policy

The IT Policy is a very wide subject. Industries differ widely in their economic characteristics, competitive situations, attractiveness and future potentials. The economic character of an industry depends on factors such as overall market size, the pace of technological change, geographical destinations, size and sophistication of sellers and buyers, identical or differentiated products or services and economics of scale or costs. An in-depth study of an industry also provides the information about the extent of competition, drivers and key success factors, industry profits outlook and potential. The Government of India, recognizing that the impressive growth the country has achieved since the mid-Eighties in information technology is still a small proportion of the potential to achieve, has resolved to make India a Global IT Superpower and a front-runner in the age of information revolution. The Government of India considers IT as an agent of transformation of every facet of human life, which will bring about a knowledge based society in the twenty-first century. As seen from the NASSCOM's report, the IT policies have been formulated with the aim at accomplishing the following basic objectives:

i) *Info-Infrastructure Drive*: Accelerate the drive for setting up a World class info infrastructure with an extensive spread of Fibre Optic Networks, Satcom Networks and Wireless Networks for seamlessly interconnecting the Local informatics infrastructure (LII), National Informatics Infrastructure (NII) and the Global Informatics Infrastructure (GII) to ensure a fast nation-wide onset of the INTERNET, EXTRANETs and INTRANETs.

ii) *Target ITEX–50*: With a potential 2 trillion dollar Global IT industry by the year 2008, policy ambiance will be created for the Indian IT industry to target for a $50 billion annual export of IT Software and IT Services (including IT-enabled services) by this year, over a commensurately large domestic IT market spread all over the country.

iii) *IT for all by 2008*: Accelerate the rate of PC/set-top-box penetration in the country from the 1998 level of one per 500 to one per 50 people along with a universal access to Internet/ Extranets/Intranets by the year 2008, with a flood of IT applications encompassing every walk of economic and social life of the country. The existing over 600000 Public Telephones/ Public Call Offices (PCOs) will be transformed into public tele-info-centres offering a variety of multimedia information services. Towards the goal of IT for all by 2008, policies are provided for setting the base for a rapid spread of IT awareness among the citizens, propagation of IT literacy, networked Government, IT-led economic development, rural penetration of IT applications, training citizens in the use of day-to-day IT services like tele-banking, tele-medicine, tele-education, tele-documents transfer, tele-library, tele-info-centres, electronic commerce, Public Call Centres, among others; and training, qualitatively and quantitatively, world class IT professionals.

The 108 Recommendations of the IT Action Plan Part-I emphasize the Policy Framework required for the IT software industry. The IT Action Plan Part-II recommends 84 policy guidelines for the IT hardware. It was observed by the IT Task Force that the software industry and the hardware industry are the two sides of the gold coin representing India emerging as a global IT super power. The success of one depends on the success of other by all means. In view of this, the IT policy have been formulated in different areas like strategic policy for IT industry, IT Research, Design and Development, IT Human Resource Development, Financing the IT sector etc.

Since the IT policy covers a very vast area and it is not possible to cover all the areas due to the dynamic change in policy, hence only two areas viz. 'Global Demand for IT Software and Services' and 'Human Resources Development' have been identified for the system conceptualization which are discussed below.

Global Demand for IT Software and Services

As seen from the table 1 for the global Software and services market size it clearly shows that the demand will continue to increase as forecasted for the year 2008. In regards to IT software and services, many organizations lagged behind their US counterparts and are now aggressively adopting new technologies. The Indian IT industry export revenues from the Product and Technology services have grown from US$ 1.08 billion in 2001-02 to US$ 1.40 billion in 2002-03 registering a growth of 29.4 per cent. The share of the product and technology services pie in the total software and services exports has risen from 13.9 per cent in 2001-02 to 14.3 per cent in 2002-03. This clearly shows that the Indian software and service companies are acknowledging the clarion call and are evolving a pragmatic roadmap in the product space. Realizing tremendous potential in this segment, NASSCOM-McKinsey study estimates the product and technology services to grow to US$ 8-11 billion by 2008.

Human Resources Development Issues

From the NASSCOM, 1999 report following facts in regard to the Human Resource Development are found out.

- Almost 70 per cent of the software professionals employed in the industry were in software development and operations, 11 per cent in marketing, 14 per cent in support and services and 5 per cent in other activities.
- The overall median age of the software professionals was about 26.6 years.
- 82 per cent of software professionals in software companies were men, whereas 18 per cent were women. However, this ratio is likely to be changed with increase in per cent for women as the govt. gives emphasis on women IT literacy. Half of the software professionals possess 5 years of working experience.
- There is an average of 19 per cent rise in basic salary in 1998 over the previous year.
- In 1998, the attrition rate was controlled at 17 per cent (from the earlier turnover rate of 25 per cent in 1992).
- The software professionals were highly rated by their employers for their quality. Most gave an average of close to a 9 on a 10 point rating, with 1 being the lowest and 10 being outstanding.
- The skills in demand were in the area of business applications of software development, Euro conversion, software engineering, Java, ERP, data warehousing, Internet, client-server networking, OOPs, windows, project management, quality assurance, telecommunications and RDBMS.
- To introduce Vidya Kalyan Scheme to integrate infrastructure provided by the State and working capital (both physical and human) provided by private enterprise to optimize available national resources for IT education.
- To aim to achieve 100 per cent IT literacy at senior secondary level (10+2) and at secondary level by govt. in association with IT HRD companies.
- To enable the students to acquire IT knowledge to be able to serve in IT-enabled services sector besides serving in IT industry directly.
- To allow Banks and Financial Institutions to float special bonds (Education Bonds) to raise capital for investment in IT.
- To offer special financial packages to Entrepreneur and NRIs to set up IT education facilities.
- To encourage all the companies, in IT as well as other sectors to set aside 6 per cent of their value added revenue (sum of salaries perquisites, net profit) to support IT HRD sector in offering IT as well as IT-enabled education through investment in infrastructure establishments/up-gradation in educational/ training institutes.
- To increase the export, the govt. should support leading Indian companies in the IT sector to help them emerge as large Multinational Companies (MNCs).
- To allow premier institutes like IITs, IIITs, NITs to establish joint ventures with IT HRD companies with the aim to achieve the Indian MNC status.
- To offer special financial incentives to employees of IT HRD companies such as Employee Stock Option (ESOP) and sweat Equity in order to minimize the rate of attrition of trained manpower from companies due to shortage of skilled manpower in the industry which will bring the stability in the IT sector and growth in the market.

- To spread the IT literacy all over the country including the remote and rural areas, the cost should be such that it can be affordable even by the poor persons.
- To institute special programs to support higher end of IT education.
- To encourage premier institutes like IITs, IIITs, NITs to establish Virtual Institutes to support IT education and research at other institutions in the country.
- To make budgetary provision to enable govt. organizations to donate computer systems and software to IT HRD institutes.
- To provide loan facility to students opting for IT HRD programs at low interest rates.
- To provide flexibility to offer higher amounts compared to normal salary to faculty under the endowment scheme offered by IT and user companies in academic institutes.
- In order to avoid unemployment problem in IT, thought should be given by the Institutes (private and govt.) that all the admitted students can find employment.
- To give more attention in basic principles of computer science in the training programs of software and hardware skills.
- To avoid the temptation to migrate, the reward package for IT professionals should be upgraded from time to time.
- To organize a special program to develop instruction material employing IT as a tool in all courses and at all levels from elementary education upwards.
- To allow IT HRD companies to use satellite and cable TV based networking, including Data Broadcast and Direct To Home (DTH) services over C band, Extended C band and other emerging satellite systems, for broadcasting educational and training programs and services over these networks without any licensing.
- To allow IT HRD companies covered under Small Scale sector to have investment from companies in large sector without any ceiling.
- To provide facilities to professionally qualified women to work from their homes.
- To evolve special HRD programs by Virtual Institutes to help educated women to enter the field of IT-enabled services.

Conceptualization of the Modules

As per the detail discussions in the IT Policy, the modules have been represented in a pictorial form through the causal loop diagram. Here special emphasis has been given on the variables that influence other variables in the model. The policy structure is conceptualized with respect to the feedback of information.

Product Demand

As already discussed in the section 'Global Demand for IT Software and Services', it is observed that there is a growing global demand for the product. In order to achieve this, we have to see how the demand is influenced by other factors or variables. The product demand is influenced by its quality at competitive prices. And to have better quality product, we will have to adopt some flexible approach in the prevailing practice, while making the product.

Keeping this thing in mind, a causal loop diagram for the product demand is depicted in Figure 2.

Human Resources Development

As discussed in the section 'Human Resources Development', it is observed that there is a demand for trained manpower in the IT software and services industry. This means that the number of trained manpower available at present has to be increased. And this is, influenced by training programs, investment in training programs, recruitment, promotion policy, reward and incentives, resource allocations etc. The causal loop diagram for the 'Human Resources Development' module is depicted in Figure 3.

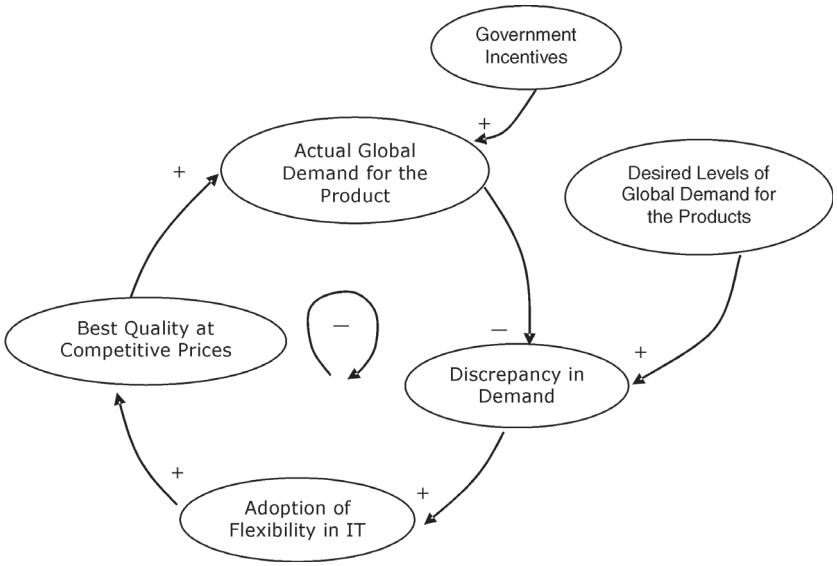

Figure 2: Global Demand for the Products

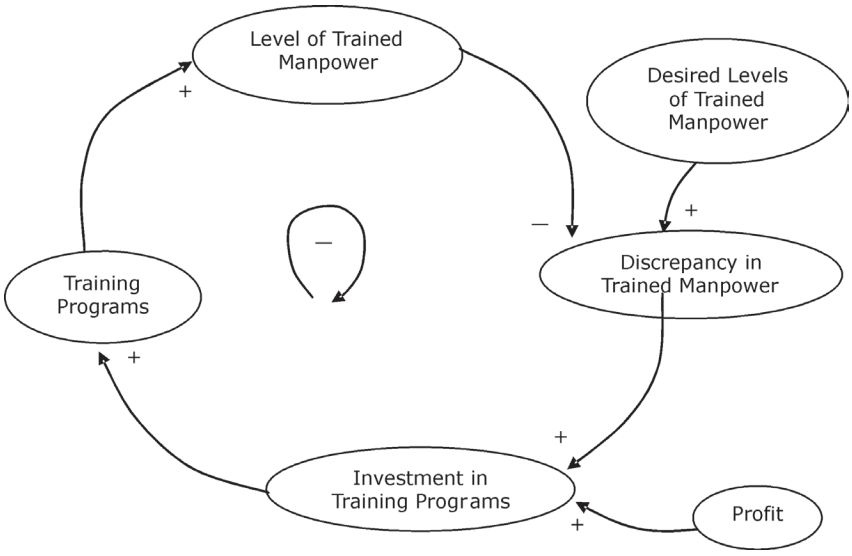

Figure 3: Human Resource Development

Concluding Remarks

IT industry is one among the growth industries in India. Its performance was satisfactory in the last decade and has been aspirant of becoming one among top few IT superpowers internationally. Despite India's resources, capabilities, potential and astounding IT growth rate, it is lamented for its low share in the total global software market. Hence it is losing its international credibility. In view of this a study is undertaken to make out the IT Policy in India. By going insight of the study, a number of issues and its cause could be found out. In this study, the conceptualization of the IT industry has been mentioned in general and that of IT software and services industry in particular where the issues like Product demand and HRD issues have been discussed in detail.

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