

## INDIA'S KNOWLEDGE ECONOMY

MOHAMMED IMTIAZ AHMED

### Abstract

This paper presents an objective view of India's position in the global economy. It recognizes India's achievements, but sees a tremendous potential that is yet to be achieved. What is needed is an India-led process to coordinate and integrate reforms, combining those in the economic and institutional regime with the many initiatives that are being undertaken in the more functional areas covered in many Indian strategy reports. This can only be done through a domestic process of consultation and stakeholder awareness-raising to get buy-in on the kinds of reforms required to implement the action that can leverage India's potential.

**Keywords :** Knowledge Economy/ India/ Higher Education

### 1. Introduction

One of the world's largest economies, India has made tremendous strides in its economic and social development in the past two decades and poised to realize even faster growth in the years to come. After growing at about 3.5 percent from the 1950s to the 1970s, India's economy expanded during the 1980s to reach an annual growth rate of about 5.5 percent at the end of period. It increased its rate of growth to 6.7 percent between 1992-93 and 1996-97, as a result of the far-reaching reforms embarked on in 1991 and opening up of the economy to more global competition. Its growth dropped to 5.5 percent from 1997-98 to 2001-02 and to 4.4 percent in 2002-03, due to the impact of poor rains on agriculture sector. India's economy surged ahead to reach a growth rate of 8.2 percent in 2003-04. This is very much in line with growth projections cited in India's Tenth Five-Year Plan, which calls for increasing growth to an average of 8 percent between 2002-03 and 2006-07 (India, Planning Commission, 2002).

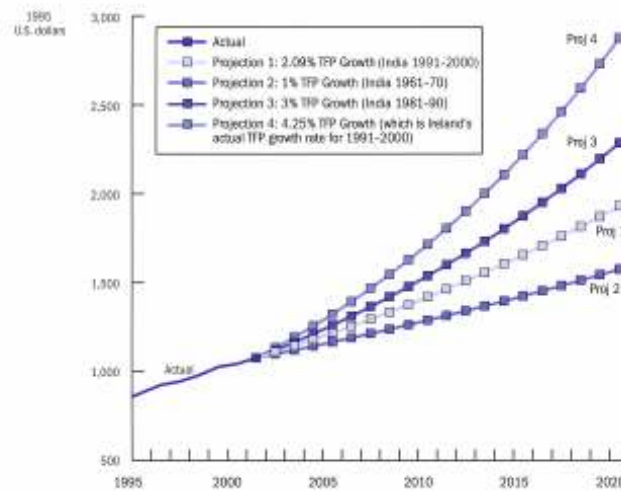
### 2. Embarking on a new growth path

India has a rich choice set in determining its future growth path. Figure 1 shows what India can achieve by the year 2020, based on different assumptions about its ability to use knowledge, even without any increase in the investment rate. Here, total factor productivity (TFP) is taken to be a proxy for a nation's learning capability.

Projection 1, 2, 3 and 4 plot real gross domestic product (GDP) per worker (1995 U.S. dollars) for India assuming different TFP growth rates from 2002 to 2020. Projection 4 is

an optimistic scenario that is based on the actual TFP growth rate in Ireland in 1991-2000. Ireland is an example of a country that has been using knowledge effectively to enhance its growth. All things being equal, the projection GDP per worker for India in scenario 4 in 2020 is about 50 percent greater than is scenario 1. Knowledge can make a difference between poverty and wealth.

**India: Real Gross Domestic Product Per Worker, Alternative Projections, 1995-2020**



Which growth path India embarks on in the future will depend on how well the government, private sector, and civil society can work together to create a common understanding of where the economy should be headed and what it needs to get there. India can no doubt reap tremendous economic gains by developing policies and strategies that focus on making more effective use of knowledge to increase the overall productivity of the economy and the welfare of its population. In so doing India will be able to improve its international competitiveness and join the ranks of countries that are making a successful transition to the knowledge economy.

### 3. Embracing the knowledge economy

The time is very opportune for India to make its transition to the knowledge economy—an economy that creates, disseminates, and uses knowledge to enhance its growth and development. The knowledge economy is often taken to mean only high technology industries or information and communication technologies (ICTs). It would be more appropriate, however, to use the concept more broadly to cover how any economy harnesses and uses new and existing knowledge to improve the productivity of agriculture, industry, and services and increase overall welfare. In India, great potential exists for increasing productivity by shifting labor from low productivity and subsistence activities in agriculture, informal industry, and informal service activities to more productive modern sectors, as well as to new knowledge-based activities. To get the

greatest benefits from the knowledge revolution, the country needs to press on and continue to implement the various policy and institutional changes needed to accelerate growth.

India has many of the key ingredients for making this transition. It has a critical mass of skilled, English-speaking knowledge workers, especially in the sciences. It has a large and impressive Diaspora, creating valuable knowledge linkages and networks, macroeconomic stability, a dynamic private sector, institutions of a free market economy, a well developed financial sector, and a broad and diversified science and technology (S&T) infrastructure. In addition, the development of the ICT sector in recent years has been remarkable. India has created profitable niches in information technology (IT) and is becoming a global provider of software services. Building on these strengths, India can harness the benefits of the knowledge revolution to improve its economic performance and boost the welfare of its people.

This paper provides a “big picture” assessment of India’s readiness to embrace the knowledge economy and highlights some of the key constraints and emerging possibilities confronting India on four critical pillars of the knowledge economy:

- Strengthening the economic and institutional regime
- Developing educated and skilled workers
- Creating an efficient innovation system
- Building a dynamic information infrastructure.

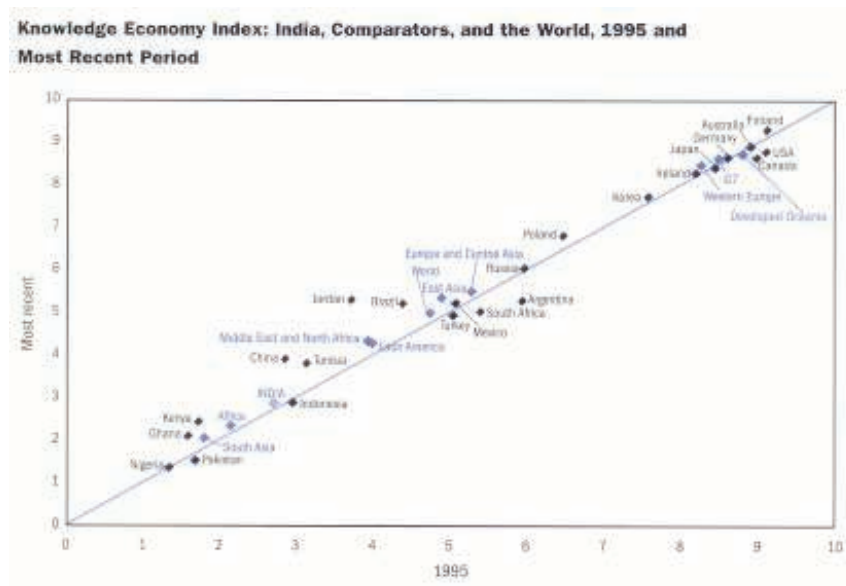
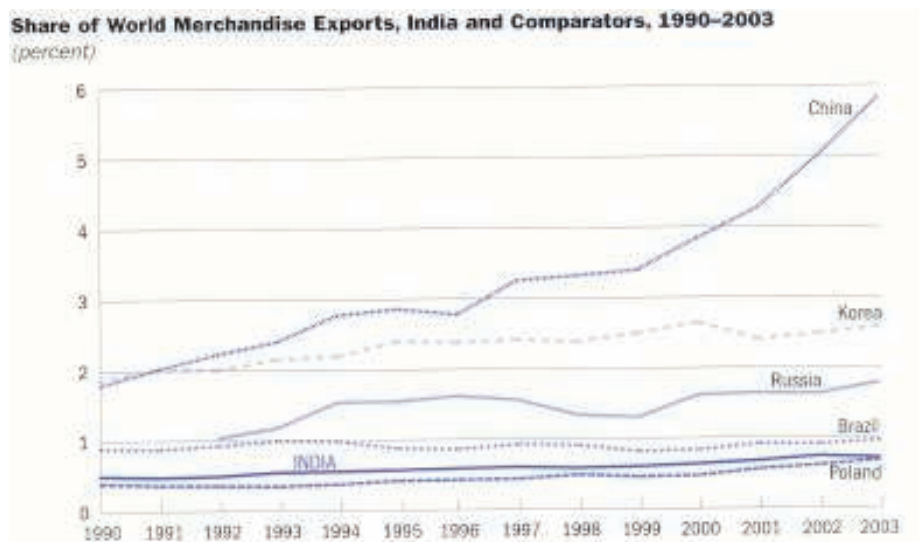


Figure 2 benchmarks India's relative global position in the global knowledge economy based on a methodology using three indicators for each of the above four pillars. It shows that India is at the top of the bottom third of the global distribution and that its relative position has improved a little in the last decade. The following are some of the key issues that India needs to address in each of the four pillars to spur growth and innovation and, in so doing, increase economic and social welfare.

#### 4. Strengthening the Economic and Institutional Regime

Taking advantage of the knowledge revolution's potential hinges on effective economic incentives and institutions that promote and facilitate the redeployment of resources from less efficient to more efficient uses. Important elements of the economic and institutional regime include macroeconomic stability, competition, good regulatory policies, and legal rules and procedures conducive to entrepreneurship and risk taking. A key feature is the extent to which the legal system supports basic rules and property rights.

Despite India's recent economic growth, a number of barriers exist, such as the multiplicity of regulations governing product markets, distortions in the market for land, and widespread government ownership of businesses that have been inhibition GDP growth, according to some estimates by about 4 percent a year. Removing these barriers and fostering a stronger investment climate would allow India's economy to grow as fast as China's—10 percent a year—and create some 75 million new jobs outside agriculture.



India is still a relatively closed economy compared with other Asian economies, in which exports account for a much larger share of GDP (33 percent in China and 38 percent in the Republic of Korea, compared with only 15 percent in India in 2003).

Although this means that India is somewhat protected from global trends, the downside is that it does not benefit from stronger foreign competitive pressures to improve performance or from the ability to draw on more cost-effective foreign inputs, such as capital goods, components, products, market share to its major competitors, especially China (Figure 3), where reforms have moved a head much more rapidly; therefore, to speed up trade reform and be able to export, Indian firms need to be allowed to import the materials and technology they need.

India also needs to boost foreign direct investment (FDI), which can be a facilitator of rapid and efficient transfer and cross-border adoption of new knowledge and technology. FDI flows to India rose by 24 Percent between 2002 and 2003, due to its strong growth and improved economic performance, continued liberalization, its market potential, and the growing competitiveness of Indian IT industries. Even so, in 2003, India received \$4.26 billion in FDI, compared with \$53.5 billion for China. But India's stock is rapidly rising: the foreign Direct Investment Confidence Index by A.T. Kearney (2004) shows that China and India dominate the top two positions in the world for most positive investor outlook and are also the most preferred offshore investment locations for business process outsourcing (BPO) functions and IT Services.

So, to strengthen its overall economic and institutional regime, India should continue to address the following related to its product and factor markets and improving its overall infrastructure:

- Speeding up trade reform by reducing tariff protection and phasing out tariff exemptions.
  - Encouraging FDI and increasing its contribution to economic growth by phasing out remaining FDI restrictions and increasing positive linkages with the rest of the economy.
  - Stimulating growth of manufactured and service exports.
  - Strengthening intellectual property rights (IPRs) and their enforcement. India has passed a series of IPR laws in the past few years, and their enforcement will be key to its success in the knowledge economy.
  - Simplifying and expediting all procedures for the entry and exit of firms, for example through "single window" clearances.
  - Reducing inefficiencies in factor markets by easing restrictions on hiring and firing of workers.
  - Improving access to credit for small and medium enterprises.
  - Ensuring access to reliable power at reasonable cost by rationalizing power tariffs and improving the financial and operational performance of state electricity boards.
  - Addressing capacity and quality constraints in transport by improving public sector performance and developing speedy, reliable door-to-door transport services (roads, rail, and ports) to enhance India's competitiveness.
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- Improving governance and the efficiency of government, and encouraging the use of ICTs to increase government's transparency and accountability.
  - Using ICTs for more effective delivery of social services, especially in health and education, empowering India's citizens to contribute to and benefit from faster economic growth.

## **5. Developing Educated and Skilled Workers**

Well-educated and skilled people are essential for creating, sharing, disseminating, and using knowledge effectively. The knowledge economy of the twenty-first century demands a set of new competencies, which includes not only ICT skills, but also such soft skills as problem solving, analytical skills, group learning, working in a team-based environment, and effective communication. Once required only of managers, these skills are now important for all workers. Fostering such skills requires an education system that is flexible; basic education should provide the foundation for learning, and secondary and tertiary education should develop core skills that encourage creative and critical thinking.

In addition, it is necessary to develop an effective lifelong learning system to provide continuing education and skill upgrading to persons after they have left formal education in order to provide the changing skills necessary to be competitive in the global economy.

India also possesses a large pool of highly educated and vocationally qualified people who are making their mark, domestically and globally, in science, engineering, IT, and research and development (R&D). But they make up only a small fraction of the population. To create a sustained cadre of "knowledge workers," India will need to develop a more relevant educational system and reorient classroom teaching and learning objectives, starting from primary school. The new system would focus on learning, rather than on schooling, and promote creativity. It would also improve the quality of tertiary education and provide opportunities for lifelong learning.

## **6. Creating and Efficient Innovation System**

The innovation system in any country consists of institutions, rules, and procedures that affect how it acquires, creates, disseminates, and uses knowledge. Innovation in a developing country concerns not just the domestic development of frontier-based knowledge. It relates also to the application and use of new existing knowledge in the local context. Innovation requires a climate favorable to entrepreneurs, one that is free from bureaucratic, regulatory, and other obstacles and fosters interactions between the local and outside business world and with different sources of knowledge, including private firms, universities, research institutes, think tanks, consulting firms, and other sources. Tapping global knowledge is another powerful way to facilitate technological change through channels such as FDI, technology transfer, trade, and technology licensing.

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India is also emerging as a major global R&D platform; about 100 multinational corporation (MNCs) have already set up R&D centers in the country, leading to the deepening of technological and innovative capabilities among Indian firms. Several Indian companies, such as Ranbaxy and Dr. Reddy's Laboratories, have also started forming R&D alliances with global firms.

Comparative Innovation Performance: India and China, Selected Variables, Most Recent Period

Variable	India	China
Gross Foreign Direct Investment as % of GDP (average 1993-2002)	.60	5.40
Royalty and license fees payment/mil. pop. (2002)	.33	2.43
Royalty and license fees receipts/mil. pop. (2002)	0.01	0.10
Science & engineering enrollment ratio (% of tertiary level students) (2002)	25.00	43.00
Researchers in R&D/million (1997)	98.85	583.88
Total expenditures for R&D as % of GDP (2001)	0.78	1.09
Private sector spending on R&D (2003)	3.50	3.80
Manufactured trade as % of GDP (2002)	13.02	41.84
High-tech exports as % of manuf. ex[ports (2002)	5.00	23.00
Scientific and technical journal articles/mil. pop. (1999)	9.23	9.31
Availability of venture capital, scale of 1 to 7 (2003)	3.80	3.00
Patent applications granted by the USPTO/mil. pop. (2003)	0.33	0.33
University-company research collaboration, scale of 1 to 7 (2003)	3.20	4.20
State of cluster development, scale of 1 to 7 (2003)	4.10	3.70

**Note:** For researchers in R&D and Researchers in R&D/million, data for China are for 2001. The higher the value for the data in the Knowledge Assessment Methodology (including qualitative variables), the better a country's performance on that variable.

Such collaboration presents several benefits for Indian industry, because the linkages among local firms, universities, and research institutes and the worldwide R&D network of multinationals further integrate India into global technology development. Such R&D activities have also been useful in inculcating a commercial culture among scientists, helping them to apply knowledge for productive ends. The outsourcing of high-end R&D to India is yet another new trend that is evident from the large number of established R&D outsourcing centers in India, from IT and telecom to automotive and pharmaceuticals sectors. India is also developing public-private partnerships to harness the potential of traditional knowledge to meet health and welfare needs and to reduce poverty.

In India, some 70 percent of R&D is performed by the central and state governments, an additional 27 percent by enterprises (both public and private sector industries), and

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less than 3 percent by universities and other higher education institutions. In contrast, in most countries in the Organisation for Economic Co-operation and Development (OECD), the private sector finances 50-60 percent of R&D, because it increasingly has the finance, knowledge, and personal needed for technological innovation. Firms play an even bigger role in R&D in Ireland, Japan, Korea, and Sweden. Universities also undertake research to a much larger extent in developed countries and have stronger linkages with the corporate world.

Some of the key issues to address in this domain include:

- Tapping into the growing stock of global knowledge more effectively and providing incentives for international technology transfer through trade, FDI, licensing, and personal movements, along with informal means through imitation, reverse engineering, and spillovers.
  - Attracting FDI more effectively, given the importance of FDI in the generation and dissemination of global knowledge and the role that they can have domestic R&D. This should include removing regulation on foreign investment and encouraging FDI in R&D into the country.
  - Encouraging members of the Diaspora and renowned expatriates to contribute further to innovative activities by appointing them to the management boards of national research institutes, universities, and so on to facilitate the design of university programs that better suit corporate requirements.
  - Motivating scientists and engineers from India working in the United State and other developed countries to enter into alliances with multinational companies and establish firms or labs to undertake R&D on a contract basis in India.
  - Auditing and monitoring S&T efforts and institutional performance to identify what works well and then redeploying resources to programs that have a proven track record of success.
  - Using the savings to strengthen university-industry programs by means of matching grants and other initiatives, including encouraging academics to spend sabbaticals in relevant industries so that their research meets the needs of the productive sector.
  - Finding alternative sources of R&D, especially as the government reduces its budgetary support for research programs. In some countries such as China, academic institutions are launching commercial ventures of their own of in collaboration with the corporate sector.
  - Allowing national research institutes to collaborate with domestic and foreign firms to forge closer links with industry. One way of encouraging scientists to work closely with industry, and in so doing improving linkages between technology development and application, would be to provide incentives such as bonuses and a share of royalties from products created through their research.
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- Paying adequate salaries and creating a proper working environment for scientist and engineers that provides them with access to capital equipment, instruments, and other infrastructure needed for R&D. Failure to compensate researchers adequately and lack of a supportive environment will only exacerbate the problem of brain drain.
- Restructuring and modernizing universities and publicly funded R&D institutions by giving them flexibility, freedom of operation, and financial autonomy.
- Increasing the intake of students into science and engineering, given the competition for recruitment of trained personnel; this may require adding colleges and universities (such as IITs of others modeled after them).
- Developing entrepreneurial skills and management training for S&T professionals to encourage them to undertake business activities.
- Encouraging the private sector to invest in R&D.
- Strengthening R&D by companies so that they can have a more demand-driven and market-oriented approach with closer collaboration among researchers, partners, and customers in developing new products and services that can be speedily brought to the market.
- Developing communication and other infrastructure for R&D, and creating an attractive environment to motivate R&D investment, including favorable tax, and other incentives.
- Establishing science and technology parks to encourage industry-university collaboration. Such parks might attract R&D work from both foreign and domestic firms if the parks are situated close to reputable academic institutions.
- Encouraging venture capital, which can also be used as an incentive for commercialization of research.
- Effectively enforcing and implementing IPRs to create confidence among domestic and foreign innovators on protection of their innovations in the country.
- Promoting a national fund to support grassroots innovators, with the aim of building a national register of innovators, converting innovations into viable business plans, and dissemination knowledge of indigenous innovations, especially for job creation.
- Strengthening the emerging new model of reverse drug design to produce innovations in a more cost-effective way based on leveraging traditional knowledge with modern science and exploiting public-private partnerships.

## **7. Building A Dynamic Information Infrastructure**

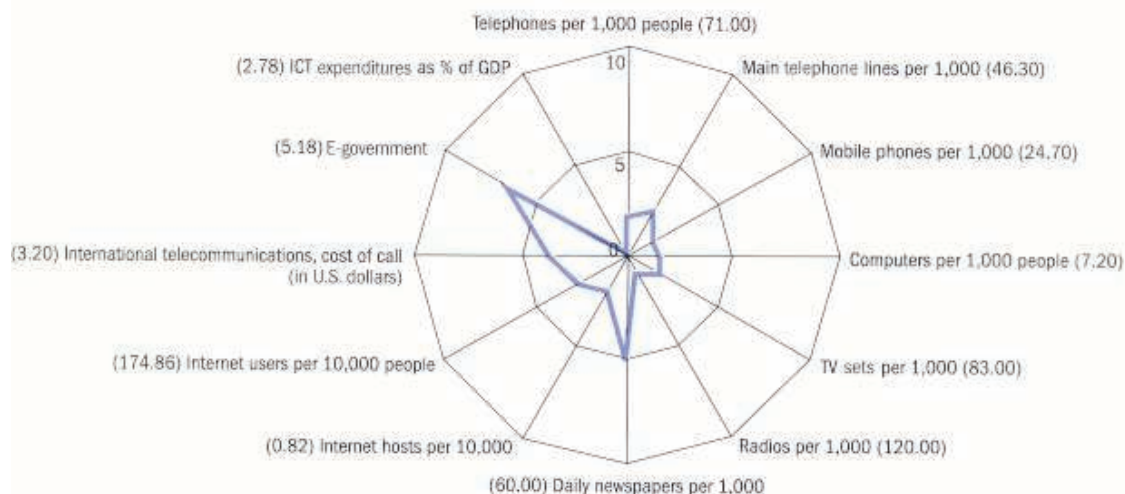
Rapid advances in ICTs are dramatically affecting economic and social activities, as well as the acquisition, creation, dissemination, and use of knowledge. The use of ICTs in reducing transaction costs and lowering the barriers of time and space, allowing the mass production of customized goods and services. With ICT use becoming all-

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pervasive and its impacts transformational. it has become an essential backbone of the knowledge economy. The information infrastructure in a country consists of telecommunications networks, strategic information systems, policy and legal frameworks affecting their deployment, and skilled human resources needed to develop and use it.

India's telecommunications sector has registered rapid growth in recent years, spurred by reforms to open markets, and introduced more competition. Many domestic and international private sector entrants are now providing consumers with high-quality services at low prices. As a result, some spectacular successes have resulted: more than 47 million people had mobile phones at the end of 2004.

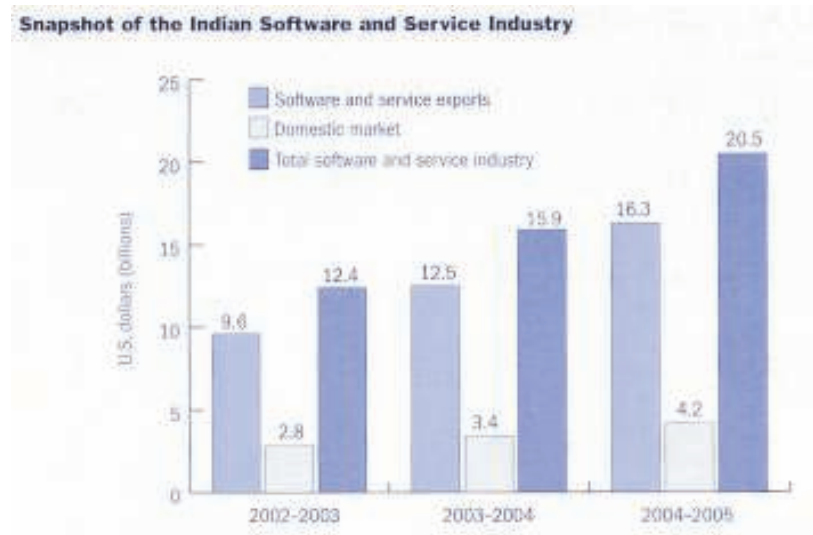
**India's Scorecard on Information and Communications Technologies, Selected Variables, Most Recent Period**



**Note :** Value in parentheses denote actual values of India for the most recent period for which data are available. Each of the 80 variables in the KAM is normalized on a scale of 0 to 10 for 128 countries. The fuller the scorecard, the better posed a country is to embrace the knowledge economy. But an economy should not necessarily aim for a perfect score of 10 on all variables because the scorecards may be shaped by the particular structural characteristics of an economy or by trade-offs that characterize different development strategies.

India can also boast of remarkable and impressive global achievements in the IT sector. According to the National Association of Software and Services Companies (NASSCOM), the Indian IT market has grown from \$1-73 billion in 1994-95 to \$19.9 billion in 2003-04, accounting for about 3.82 percent of India's GDP in 2003-04 and providing employment for almost a million people. India's IT services are moving up the value chain, and India is now undertaking new and innovative work, such as the management for clients of IT-related business processes. It is making an impact also in IT consulting, in which companies such as Wipro, Infosys, and Tata are managing IT networks in the

United States and re-engineering business processes. In fact, Infosys was ranked the ninth most respectable IT company in the world in 2004, behind Hewlett-Packard, IBM, Dell, Microsoft, AP, Cisco, Intel, and Oracle. In chip design, Intel and Texas Instruments are using India as an R&D hub for microprocessors and multimedia chips.



### 7.1 Factors contributing towards development in IT industry

Several factors have contributed to India's success in the IT industry, including the existence of a highly skilled, English-speaking workforce coming out of India's engineering schools and earning lower wages than their European and U.S. counterparts; low dependence of IT on physical infrastructure; the Indian Diaspora; and the introduction of current account convertibility and easing of controls and regulations in the early 1990s. The Indian government, in keeping pace with up-to-date technological advancements, announced its Broadband Policy in 2004 to provide an impetus to broadband and Internet penetration in the country.

The World Economic Forum's (WEF) Global Information Technology Report 2002-03(2003), India's IT industry is expected to grow at a compounded annual rate of 38 percent to reach \$77 billion by 2008—contribution to 20 percent of India's anticipated GDP growth in this period and 30 percent of its foreign exchange earnings. By that year, it is also expected to employ more than 2 million people and indirectly create another 2 million jobs! But one of the key inputs to achieving sustained growth and exports in the IT sector will be the availability of high-quality professionals in adequate numbers. India needs to maintain and enhance its competitive advantage of having abundant, high-quality, and cost-effective human resources. The country must ensure the right mix of technical, business, and functional skill in the workforce to meet the needs of individual business segments and customer markets. This requires harmonization of the demands of industry with the supply of trained manpower coming from Indian educational and training institutions.

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As a result of the IT expressive progress in the telecommunications and ICT sector, it is no surprise that usage of ICTs has been growing in the country. But explosive growth of ICTs has mainly been concentrated in urban areas. As the telecommunications sector moves to a more commercial and competitive environment, the government should implement practical policies to enhance the reach of IT to groups not well served by the market. The real challenge is to promote the effective application and use of ICTs throughout the economy to raise productivity and growth, not just in a few pockets. Ensuring that the benefits of ICTs are shared by all requires an enabling environment for ICTs.

Steps in enhancing India's information infrastructure are :

- Enhancing regulatory certainty and efficiency to facilitate new services that will enable India to reap the benefits of the convergence of existing and new technologies and enable the sector to contribute more to economic growth.
  - Boosting ICT penetration by resolving regulatory issues in communications and reducing and rationalizing tariff structures on hardware and software.
  - Increasing the use of ICTs as a competitive tool to improve the efficiency of production and marketing in areas such as supply chain management, logistics, information sharing on what goods are selling in the markets, responding to rapidly changing market needs, and so on.
  - Moving up the value chain in IT by developing high-value products through R&D, improving the quality of products and services, marketing products and building brand equity to position the "India" brand name further, including by strengthening marketing channels with strategic global links, expanding the focus outside the United States to emerging markets in Asia, the Pacific, Japan, and so on.
  - Providing suitable incentives to promote IT applications for the domestic economy as the focus currently seems to be mainly on IT services exports. This includes developing local language content and applications.
  - Putting in place suitable human resource development and training initiatives, starting at the primary school and moving on to the tertiary levels to meet the expected growth of IT and other productive sectors of the economy.
  - Updating syllabuses in computer engineering, electronics, and IT in various technical institutions to meet the demands of industry (curriculum in other branches of engineering should also be broadly based to include IT subjects).
  - Massively enhancing ICT literacy and skills among the population large through conventional and non conventional means, so that people can begin to use ICTs to derive benefits, both economically and socially.
  - Creating opportunities for local communities to benefit from ICTs by providing support (seed money for local innovation on low-cost and appropriate technologies), enhancing private investment in ICT infrastructure, and promoting national and international support for rural community-based access. Strengthening
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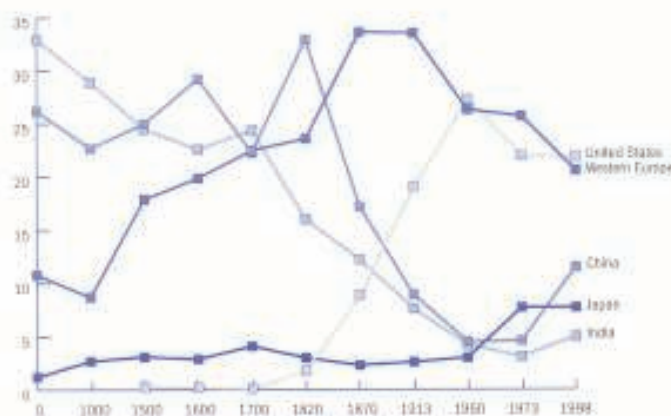
partnerships among government agencies, research and academic institutions, private companies, and non governmental organizations(NGOs) to ramp up the ICT infrastructure and achieve faster penetration of ICTs.

- Further developing and scaling up(in joint public-private initiatives where feasible) ICT applications, such as community radio, fixed/mobile phones, smart cards, Internet, and satellite television, to bring the benefits of connectivity to rural communities all across the country and improve the delivery of services to rural populations.
- Sharing successful application of ICT, for example, in e-government among different Indian states. This also requires scaling up successful ICT initiatives to bring the benefits of connectivity to rural communities all across the country.
- Creating a suitable environment for the effective use of ICTs to permeate the entire economy and lead to flourishing competition and business growth. This calls for the government to continue with the economic reform agenda put in place in the past decade.

## 8. Looking Ahead

The notion of a knowledge economy is not new or foreign to India. India's past achievements in science, philosophy, mathematics, and astronomy reinforce the notion that the country has for millennia been a leading "knowledge society." In economic terms, India was the world's largest economy in the first millennium, producing a third of global GDP(figure 5). By 1500 its share had declined to 25 percent, as China overtook it and Western Europe's share began to expand rapidly. India's share continued to fall after 1700 due to the collapse of the Moghul Empire, the costs of adjusting to British governance, and the rapid increase in the share of Western Europe, followed by the spectacular rise of the United States. India was a latecomer to the industrial revolutions. It cannot afford to miss the knowledge revolution!

India: Percentage Share of Global Gross Domestic Product, Years 0-1998



## 9. Launching A Process

A very appropriate national champion to coordinate and orchestrate the necessary knowledge-related actions across the various domains would be the Prime Minister's office. Some examples of cross-cutting knowledge economy issues that the task force could address include:

- In the past decade, India has undertaken major economic reforms; as a result, its growth rate has increased from 3.5 percent in the 1950s to 1970s to approximately 6 percent between the 1980s and 2002. During much of this period, however, China has been growing at about 10 percent. What are the fundamental reforms needed to unleash India's tremendous entrepreneurial potential and benefit from more achieve participation o\in the global knowledge economy to achieve this higher rate of growth sustain ably? What actions are necessary to bring a much larger proportion of the population into the modern sector? What special initiatives have to be undertaken to marshal knowledge to improve the livelihoods of the poor?
- India has the advantage of a highly skilled human resource bas, which has gained world renown. It also has world-class institutions that train this world-class manpower, but on a limited scale. What would it take to ramp up such institutions even further so that India can become a leader in education and training, not only in IT and software, but also more generally in high-skill areas that can provide greater out sourcing services to the world?
- An increasing number of multinational corporations are currently working with Indian firms to contract and subcontract high-end R&D. How can India become a global leader in innovation in its own right, not only in IT-related areas in which it has carved out a global niche, but also in other knowledge-intensive industries, such as pharmaceuticals and biotechnology?
- India is a leading exporter of IT services and software, but has not yet fully harnessed the potential of ICTs at home to reduce transaction costs and improve efficiency. As it has a large local market and many needs, what will it take for India to exploit this capability on a larger scale domestically and help the country leapfrog even more rapidly into the knowledge economy of the twenty-first century?

Dealing with the kinds of illustrative issues highlighted above requires prioritization and working with many different interest groups, which is not an easy task; thus, some guiding principles for the Knowledge Economy Task Force would include the following:

- Defining priorities and establishing budgets
- Adopting systemic, integrated approaches for the different policy planks at all levels of government
- Mobilizing state governments, which are key to the Indian economy and its modernization

- Multiplying experiments and publicizing concrete initiatives that clearly exemplify the move to a knowledge-based economy.
- The role of the Prime Minister's office would be to put in place a robust mechanism to facilitate, monitor, and scale up successful initiatives.

## 10 Conclusion

India is well positioned to take advantage of the knowledge revolution to accelerate growth and competitiveness and improve the welfare of its citizens and should continue to leverage its strengths to become a leader in knowledge creation and use. In the twenty-first century, India will be judged by the extent to which it lays down the appropriate "rules of the game" that will enable it to marshal its human resources, strengths in innovation, and global niches in IT to improve overall economic and social development and transform itself into a knowledge-driven economy. Sustained and integrated implementation of the various policy measures in these domains would help to reposition India as a significant global economic power, so that it can rightfully take its place among the ranks of countries that are harnessing knowledge and technology for their overall economic development and social well-being.

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## BIOGRAPHY OF AUTHOR



**Mr. Mohammed Imtiaz Ahmed** holds MSc in Chemistry and MLISc. Presently working as Assistant Librarian at Pandit Ravishankar Shukla University, Raipur – 492010 (Chhattisgarh). Has 26 years of extensive experience in Library. Has 20 years of teaching experience and 8 years experience as incharge University Librarian. Has attended several training programmes at DRTC, Bangalore & INFLIBNET Ahmedabad, related to computer applications in LIS. Has actively contributed for various seminars (14 papers).

**Email: [imtiazexplores@gmail.com](mailto:imtiazexplores@gmail.com)**

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