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Innovation in India: A Path to Knowledge Economy

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Abstract A nation has to innovate to survive in a knowledge economy. It is of interest why a country like India which has an exemplary record of innovation and discoveries since prehistoric period is falling behind than even comparable economies in Innovation Index. The present paper highlights India's potential and achievements in innovation and entrepreneurship in recent times and throws light what impedes India's success as an innovative nation.

Keywords Knowledge economy · Innovation · Medical tourism · Entrepreneurship

Knowledge Economy Background

Powell Walter and Snellman [25] defined knowledge economy as "production and services based on knowledge-intensive activities that contribute to an accelerated pace of technological and scientific advance as well as equally rapid obsolescence." Earlier works on knowledge economy focus on effect of science and technology on socioeconomic development [18, 23, 24, 31]. Some works on knowledge economy highlight on contribution of knowledge intensive industries like information technology industries to national productivity [3, 11]. Yet, another most modern and important dimension of study on knowledge economy is on contribution of innovation and learning to industrial performance [7, 9, 22].

How knowledge has affected modern civilization can be understood from the fact that how search engines and knowledge database had made accessibility of knowledge easier. Computer games, DVD, and television have become an integral part of teenage learning and entertainment. Information technology has been highly successful in creating solidarity of thoughts and harmonization of actions of people of all corners of the world irrespective of cultural differences [15]. In a survey

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conducted by Radovan [28] in Croatia on students of information technology, mathematics, and pedagogy, 26% of respondents felt that information technology stimulates creativity and diminishes the inclination towards destruction, 14% hold the view that technology has exactly the opposite effect, a vast majority of 60% hold that technology by itself does not have a relevant impact on human inclinations; technology only intensify the effects of human inclinations and activities, equally of the creative and of the destructive ones.

There has been growing interest in measurement of development of status of knowledge economy in the society. A major thrust has been in measurement of human capital, intellectual capital, and efforts towards research development.

The World Bank has initiated the Knowledge for Development Program to help client nations to assess their capability of tapping global knowledge for social welfare and development. The four pillars of knowledge assessment (www.worldbank.org/kam) as stated by World Bank's Knowledge Assessment Methodology are as follows:

1. Economic and institutional regime: The country's economic and institutional regime must provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship. The indicators are tariff and non-tariff, regulatory authorities, and rule of law.
2. Education and skills: The country's people need education and skills to enable them to create and share, and to use it well. Gross secondary and tertiary enrollment rate and adult literacy rate are key indicators of educational achievement.
3. Information and communication infrastructure: A dynamic information infrastructure is needed to facilitate the effective communication, dissemination, and processing of information. The indicators are telephone, internet, and computers per 1,000 people.
4. Innovation system: The country's innovation system—firms, research centers, universities, think tanks, consultants, and other organizations—must be capable of tapping the growing stock of global knowledge, assimilating and adapting it to local needs, and creating new technology. The indicators are royalty and payments/receipts per person, technical journal articles per million and patents granted to nations by US Patent and trademark office per million people.

Confederation of Indian Industries in collaboration with INSEAD World Business School supported by Cannon India has devised the Global Innovation Index It considered the five parameters of innovation enablers namely, human capacity, general and ICT infrastructure, business and scientific sophistication, two measures of innovative output measure, i.e., scientific outputs and creative outputs and well-being. India has been ranked 56th in the 2009–2010 Global Innovation Index out of 132 nations.

What is Innovation?

Goswami and Mathew [12] have given a detailed literature review on the definition of innovation. Myers and Marquis [21], Zaltman et al. [32] and Drucker 1985 [8] look at innovation in the point of view of technological innovation. Lundvall's [17]

definition includes non-technological innovations, including institutional innovations. Freeman [10] emphasized role of social and educational innovations (pp. 339–41). Carlsson and Stankiewicz [4], extended definition of innovation to include the development of new organizational setups. Schumpeter's definition sums up the following forms of innovations : (1) introduction of new product or qualitative change in existing product, (2) process innovation new to an industry, (3) opening of a new market, (4) development of new sources of supply for raw material, and (5) other inputs and changes in the industrial organization. Boer and During [1] defined innovation as the creation of a new product–market–technology–organization combination.

India's Historical Quest for Knowledge and Innovation

Indian Upanishad [6] speaks that there are four forms of education: learning from the teachers, learning through self-reflection and introspection, learning through peer interaction, and learning in time context through experience. Upnishad describes five layers of knowledge: knowledge for satisfying basic needs, knowledge for developing means of existence, knowledge for psychological well-being, knowledge based on rational thinking and knowledge of purpose.

India's quest for knowledge began from the prehistoric period, with the discovery of zero, Hindu-Arabic numerical and discoveries in astronomical science which have been popularized by Al'Beruni. The Srimad Bhagvat Gita is the treasure house of spiritual knowledge, morality, ethical way of life, and knowledge of highest pursuit of differentiation between good and evil. Kautilya's Arthashastra teaches us the ethical code of conduct in administration and accounting rules, arguably the first work ever on principles of governance. India's expertise in various fields of knowledge had attracted expedition by foreign travelers like Huin Tsang, Marco Polo, and Vasco Da Gama.

The eighteenth century saw an emergence of another string of famous scientists in various domains of science and mathematics like Meghnath Saha, Chandrashekhar Venkat Raman, Jagdish Chandra Bose, Srivivas Ramanujan.

The twentieth and twenty-first century saw human interest in multidisciplinary studies like biotechnology, genetic engineering, neurophysics, biochemistry, econometrics, etc.

There is no denying the fact that India is still moving ahead to assimilate itself in the modern Knowledge Economy brought in by the Information Technology Revolution of the 1990s and signing up of the Intellectual Property Rights under World Trade Organisation (WTO). Information technology, in the present era, provides the basic framework for acquisition and creation of knowledge repository on various domain and application and distribution of knowledge for the betterment of the society. The focus now in India has shifted substantially towards research and development (R&D) and innovation having successfully registered several applications under US Patent and Trademark. Internet, broadband connections have penetrated to most urban household, but rural areas are still lacking on IT infrastructure as would be discussed in more detail in the coming sections. India has been included in the 34 nations under World Knowledge Competitiveness Indexes (WKCI). India, along with China is considered to form the Knowledge

Cluster of South Asia with three of its cities, Mumbai, Bangalore, and Hyderabad enlisted among the 145 cities which form knowledge powerhouse under WKCI report. Revolution in the ICT has brought forth new opportunities by easy accessibility of knowledge at all levels. The knowledge workers, the managers, information technology professionals, the medico-professionals, lawyers, educationists form a substantial part of the population than even a decade ago. Bangalore boosts to have nurtured three of the global leaders in software solution like Wipro, Satyam, and Infosys.

Present Scenario in Innovation and Entrepreneurship

After the modernization of the Intellectual Property Right (IPR) in 1995 with full compliance with the WTO, there has been much focus in India towards promoting research and innovation and IPR infrastructure. India is considered to be the 11th largest patent office of the world in terms of number of patent filings. According to the WIPO statistics database, July 2008, there have been 24,505 patent filings in the Indian patent office out of which there are 4,521 resident filings in the year 2006. In fact, an annual growth rate of patent filings in India in 2000–2007 has been the second largest with 24.5% next only to China which has a growth rate of 32%. Out of the total filings India granted, there are 2,924 nonresident patents and 1,396 resident patents. The Relative Specialisation Index, which shows a country's share in foreign-oriented patents in a specific technology as compared to a country's share in all foreign-oriented patents is specially high in organic fine chemistry (1.88), pharmaceuticals (1.672), food chemistry (1.13), and medical technology (0.711). India has filled 1,635 patents through business houses, 730 through government-owned organizations, and only six through other research institutes between 2000 and 2007. No patent has been filled by universities. India's research development expenditure is a little over 1% in the last few years. According to the WIPO statistics database and UNESCO, July 2008, the research and development expenditure (in millions of constant US dollars, based on purchasing power parities and lagged by 2 years to derive the resident filings to R&D ratio) of India is 0.398 which makes India the 22nd ranked in R&D expenses. The figures for comparable economies are Brazil (0.519), Russia (3.385), China (2.439), and Republican of Korea (5.597). The average annual salary of researchers is US $11,526 and when adjusted for purchasing power parity it is US $56,780. So, India has a cost advantage for research investment. The government still forms the bulk of the R&D investment. The government agencies such as Council of Scientific and Industrial Research (CSIR), ICAR, NCAER, and ICMR form bulk of patent filings in USPTO. In 2004–2005, out of a total of 229 patents granted to Indian innovators, CSIR has 140. The research innovation in CSIR and other Indian research institutes have been in areas of pharmaceuticals and food chemicals [5]. Out of the top 1,400 global companies with the highest R&D expenditures, there are only 15 Indian-based companies. By R&D as percentage of sales, these companies are Tata Motors (10.5%), Mahindra & Mahindra (11.7%), Bharat Heavy Electricals (3.1%), Corus now part Tata Steel (5%), Novelis (Canada) now part of Hindalco Industries (1.6%), Reliance Industries (8.7%), Ranbaxy Laboratories (6.7%), Dr. Reddy's Laboratories (17.6%), Sun Pharmaceuticals (23.1%), and Cipla India (17.9%). The software companies

included in the list are Polaris, KPIT Cummins, Infosys, Aztecsoft, and Prithvi Information. The R&D innovations in the software sector have mostly been by foreign companies. Of the top 50 most innovative companies by Business Week and Boston Consulting Group Survey 2009, there are three Indian companies Infosys, Reliance Industries, and Tata group.

The major knowledge clusters in India are the National Capital Region of Delhi, Mumbai, Pune, Bangalore, and Hyderabad due to the simultaneous existence of research laboratories, MNCs with high innovative index and quality higher education institutes.

Some of the Efforts and Achievements in Science and Technology

Globally, innovation is recognized in the form of product innovation, process innovation, and service innovation. Indian IP laws allowed only process innovation. Indian pharmaceutical companies copied and developed low-cost molecules discovered in Western countries. With a change of IP laws in 2005, product innovation has been allowed. Some of the ventures in India on product and process innovation are as follows.

Nanotechnology

On realization of the significance of nanotechnology in the fields of health, science, and defence, there has been a growing impetus on R&D in nanotechnology in the Indian Institute of Technology, Indian Institute of Science, National Institute of Pharmaceutical Education and Research, and National Instrumentation Organisation. Besides, there are private–public partnerships as given in Table 1.

There has been evidence of a successful use of nanotechnology in the health sector like development of Nanoxel—indigenously developed nanotechnology-based drug delivery system for cancer treatment in the Indian market by Dabur India, patented technology for gene repair therapy by Virtuous Innovation, a group company of Khandelwal Laboratories, etc. The success of nanotechnology has also been seen in other fields like creation of Nano-shirts under the brand name of Park Avenue by Raymonds, and the successful launch of nanotechnology-based water purifier by IIT Madras, etc.

Table 1 Public and private partnership in nanotechnology (Source: nanomission.gov.in)

1. Nano Functional Materials Centre, IIT Madras	Murugappa Chettiar and Orchid Pharmaceuticals
2. Nano Technology Centre, University of Hyderabad	Dr. Reddy's Laboratories
3. Centre for Interactive & Smart Textiles, IIT Delhi	ARCI, Hyderabad & Textile Industry
4. Centre for Pharmaceutical Nanotechnology, NIPER, Chandigarh	Pharmaceutical industry
5. Rubber Nanocomposites, MG University, Kottayam	Apollo Tyres
6. Nanophosphor Application Centre, University of Allahabad	Nanotech Corp., USA

ICT-Based Inclusive Growth

Some of the ICT-based initiatives to ensure inclusive development have been indirection of expanding telemedicine connecting 180 rural centers to 20 super specialty health centers to telehealth care and prevention, including teleconsultation, telediagnosostic, and teletreatment. The project was initiated by the Appolo group of hospitals at 24 clusters covering 50,000 villages around Aragonda village in Andhra Pradesh. Further, there has been introduction of the Max Vijay scheme, an insurance product aimed for the deprived section of society to be sold by non-government organizations (NGOs), microfinance organizations connected IBM-designed wireless hand-held devices, which enable data transfer through GPRS to the back-end system and facilitate on-the-spot issuance of insurance policies.

In the education sector, EDUSAT is a satellite connectivity system which is developed and used for teacher training and higher education programs in remote villages by Indira Gandhi National Open University. The National Council of Education and Research Training also hold satellite-based interactive educational programs for teachers all over the country.

EducompTM MagiKeys solution is a unique software application that allows millions of government school students to surf the web, email, chat, and write documents in their mother tongue. It supports 11 Indian languages, namely Hindi, Marathi, Gujarati, Kannada, Tamil, Malayalam, Punjabi, Urdu, Telugu, Bengali, and Konkani. Reliance Communication is collaborating with One Laptop per Child Foundation to provide network facility for providing every child with a low-cost, handy, rugged laptop to experience collaboration and a joyful learning experience in 25,000 towns and 600,000 villages in India.

MCA21 is a Ministry of Corporate Affairs and Tata Consultancy effort for e-business transaction using a director identification number and digital signature. The state of Gujarat which has won the national award for best e-governed state has the largest optical fiber wire area network of 50,000 km in Asia. All activities of governances like procurement of business, taxation, and public grievance management are carried out mandatorily through the Internet.

EnAble India, an organization started by two software engineers works towards an increasing employability of handicapped people by ICT-based training by using software like SAFA, a low-cost screen reader software based on windows, which transforms text on screen into synthetic speech aimed for visually challenged people and also by creating digital audio books and other educational tools in collaboration with other NGOs. It also acts as a link with organizations which can provide employment opportunity for these people, by helping these organizations to create a barrier-free workplace.

Lifeline, a project initiated by One World Foundation in collaboration with CISCO and British telecom aims at providing its clients, farmers with requisite information on their queries using telephony and Internet in their mother tongue. Queries made through landlines or mobiles are passed through interactive voice response to a knowledge worker who tries to solve the problem with the help of a database of 30,000 frequently asked questions with answers or else refers it to an expert.

For providing white collared employment to various unemployed youths, a project SMSOne was started by a Pune-based entrepreneur under which an unemployed youth builds an SMS community of about 1,000 cell phone users in his area and provides them with news and updates through an SMS newsletter. The service is free of cost for the user, and revenue is generated through advertising. Only one message per week is permitted. The news can be government messages, news, and advertisements of shops of the locality, birthday alerts, and election propaganda of local leaders and politicians. CG-Net and ICT-based forums of journalists created by Shubhranshu Choudhury of Chattisgarh, which aims at ensuring public participation in development, is a web-based discussion forum of ordinary people of local community which feeds in news related to tribal life, culture, farming, Dalit issues, the Naxal movement, education, gender issues, health, mining, employment, etc.

Some Innovative Business Models

Indian Premier League

In 2008, the vice president of the Board of Control for Cricket in India, Lalit Modi, partnered with IMG executive Andrew Widblood to initiate the India Premier League, a T-20 version of cricket, in which each match is to be of around 3 h with each competing participant having to face 20 overs each. Teams were auctioned to leading business tycoons and Bollywood celebrities which ensured pumping in huge money. The IPL was expected to generate revenue of nearly US $2 billion over in 2008–2019, including proceeds from TV rights (US $918 million), promotion (US $108 million), and franchises (US $724 million). Players are being offered US $1.55 million for an IPL season of about 5 weeks as against US $50,000 to US $ 1 million for having to play for their national team in a year, depending on how engaging the schedule their respective national teams have.

VNL

VNL, a start-up company, awarded as Telecom Asia's Best Green Infrastructure of the year in 2010 (http://www.telecomasia.net/content/ta-reader-choice-awards-2010-winner-list) is the first solar power-driven World GSM mobile service meant for rural areas with *low levels of average revenue per user*. It has also been named as "Technology Pioneer 2010" by the World Economic Forum. It had to face the challenges of low power services, availability of less number of skilled engineers for installation and maintenance of the GSM system, and poor infrastructure.

The model developed requires less than 50 W of power per base station and hence does not require a power grid, nearly zero maintenance; the entire base station can be packed into two carts and can be installed by even unskilled laborers.

Narayana Hrudayalaya

According to the World Health Organisation Report, the number of doctors per 1,000 population in India is less than one, and there is a requirement of 6,000

doctors, ten lakh nurses, and two lakh. Only 0.5% of Indians have health insurance, and out of pocket spending is about 85%. About 2.4 million Indians require cardiac surgery per year, and only about 60,000 operations are actually carried out. Narayana Hrudayalaya at Bangalore was initiated by Dr. Devi Shetty with the vision of providing the highest quality health care services to patients with heart problems at the lowest cost. It planned to achieve high volumes of OHS and catheterization operations per day which brought down the unit cost of surgery. Also, high-cost machines are rented instead of purchased to bring down the cost further. Suppliers are hired under short-term contracts and low-cost dual medicines like cardio-diabetic medicines of Bicon for bringing down costs of medication. It has initiated India's largest telemedicine and network and also has provision of mobile cardiac care. Dr. Shetty is also credited to have started the most successful microinsurance project in India called Yashwashini targeted for farmers of Karnataka for Rs 5 (US $0.11) a month; cardholders had access to free treatment at 150 hospitals in 29 districts of the state for any medical procedure costing up to Rs 100,000. It is now working to extend its clinical expertise to cancer with the launch of Biocon, a 1,400-bed facility providing treatment for head-and-neck, breast, and cervical cancers.

Jaipur Foot

An artificial limb invented by an Indian temple sculptor, Ram Chandra in the 1960s, is now being made out of lightweight polyurethane with the intervention of the Indian Space Research Organisation which brings down the cost to US $27, and the foot can be bended to perform different postures like squatting which are commonly done by the Indian population.

Tata Nano

The people's car was introduced by Tata Motors in January, 2008 at a price rate of a minimum of Rs 100,000 which is stylish, fuel efficient, comfortable, and safe—targeted for families who travel by bikes/scooters as they cannot afford to buy cars.

Medical Tourism

Medical tourism in India as found by Brotman [2] is either outbound, inbound, or intrabound. Hospitals catering to both inbound and intrabound medical tours have shown significant profits with India's growing economy. Tourists from the USA prefer to go to developing nations for medical tours as there are many forms of surgery such as cosmetic surgery, dental reconstruction, gender reassignments, etc. Similarly, in Britain and some other European countries where health care is controlled by the government health care system, long queuing for requisite operations may lead citizens to foreign lands [14]. People also come here from certain countries for certain operations like bone marrow transplant, joint replacement, and stem cell treatment for cancer which otherwise are not performed in their countries. Also, medical treatments in India are considerably lower. A heart valve replacement surgery would cost [30] patients US $10,000 in Thailand, US $12,500 in Singapore, US $200,000 in the US, and US $90,000 in Britain and only

US $8,000 in India. While a bone marrow transplant would cost US $30,000 in India, doctors in the USA would charge anywhere between US $250,000–400,000 while those in the UK would charge US $150,000. A cosmetic surgery would cost US $3,500 in Thailand, US $20,000 in the US, and US $10,000 in Britain and will cost only US $2,000 in India.

According to the American Medical Association data, a spinal fusion would cost US $62,000 in the USA, US $5,500 in India, US $7,000 in Thailand, and US $9,000 in Singapore. Medical tourism in India is growing at the rate of 30%. It is expected to reach US $2 billion by 2012. Escorts, Apollo Group of Hospitals, Hinduja and Jaslok are some of the major plyers in Medical tourism. Indian medical treatments include alternative treatments like ayurveda, yoga, unani, sidha, and homeopathy treatments. There should be insurance policy, travel support, and online information on the types of treatment availability and hospitality, and there should be clean and hygienic conditions in hospitals.

Impediments to Innovation

1. Lack of Innovation Culture

   As Welzel Iglehart cultural map puts India along with other developing nations at a position of higher survival values and low in self-actualization value, Hofstede's [13] scores also indicate that India has a low to moderate uncertainty avoidance, high power distance, low masculinity, and low individualism. Although it is only indicative, it reveals that Indians are probably risk averse, hesitant to make important decisions in work-related matters, and probably lack initiative. Mashelkar [19], in his speech, says that there are several ideas by Indians which have been converted into successful patented products by Japanese after research papers written by Indians related to the same were published. The educational system have long been "encouraging rotting" rather than experimentally learning in the form of problem solving, design, experimentation, etc. in the education curriculum. Evaluation requires encouragement in subjective responses rather than objective answers. Competency-based customized career plan and curriculum is required to be designed for each child.
2. Lack of Innovation Ecology

   According to the National Knowledge Commission survey, the most important barriers to innovation as perceived by both large firms and SMEs, is skill shortages due to the lack of emphasis on industrial innovation, effective collaboration for research between universities and R&D institutions, excessive government regulation as well as insufficient pricing power to derive value from innovations. Further, it has been found that out of the graduates passing out of professional institutes [20] only 25% of engineers, 15% of finance and accountancy professionals, and 10% of graduates with Indian degrees are employable by multinational companies. Fifty-four percent of the Universities under University Grant Commission are giving education in the general discipline (Table 2).

   The data shows that, clearly, majority of the students in higher education institutes are educated in the general streams which necessarily implies that there

Table 2 Distribution of central and state universities into types of discipline (Source: UGC Annual Report, 2004–2005)

Type	Number	Percent
General	126	54
Agricultural	35	15
Technological	14	6
Language	11	5
Medical	9	4
Law	6	2.6
Woman	5	1
Animal and fishery	4	1.7
Open	11	5
Others	16	5.7
Total	237	100

UGC University Grant Commission

are few institutes providing education in the technological and medical fields (Table 2).

Further, the number of researchers in India has increased by only 20% from 1991 to 2001 as compared to China where the comparative increase was about 80% (Knowledge Commission Report). To develop quality researchers, India should promote a university–industry link in running PhD programs, for example, Reliance Life Sciences has developed a model under which they facilitate employees getting admission for a PhD degree from Mumbai University. BITS Pilani, similarly, has a PhD program for working executives (http://www.knowledgecommission.gov.in/downloads/documents/moreQualityPhD.pdf). A report on 1,473 NAAC accredited colleges between 2002 and 2004 shows that there are, overall, only 25.6% PhD teachers. Indian universities need to have good academicians with a PhD degree. According to Furqan Qamar and S. Sinha [27], there are 57% of teachers in higher education who are without an MPhil and a PhD degree. With various universities not being able to fill up the posts under various reservation categories, universities are recruiting ad hoc and guest faculty.

To emphasize individual and industrial innovation, NKC suggested to allow licensing and royalty arrangement in which the inventors as well as research institute would have a share. To promote research, several government programs have been initiated like New Millennium Indian Technology

Table 3 Venture capitalist investment at various stages of innovation (Source: TSJ Venture Intelligence, India)

Stage of the company	Number of deals, 2006	Number of deals, first half 2007
Early stage	59	24
Growth stage	42	25
Late stage	104	67
PIPE	61	34
Buyout	11	6
Others	22	6

Leadership (NMITL), Techno-Entrepreneurs Promotion Program, and Technology Development Board. To provide for need of a talent pool, eight IITs and three ISAERs are being opened. NMITL has so far evolved 57 largely networked projects in diverse areas viz. agriculture and plant biotechnology, general biotechnology, bioinformatics, drugs and pharmaceuticals, chemicals, materials, information and communication technology, and energy, involving 80 industry partners and 270 research groups.

3. Lack of Venture Capital

   There is a general lack of venture capital for start-ups who want to experiment with new ideas. The investment by venture capitalists has been in the late stage as can be seen from the Table 3.

   To facilitate commercialization at the early stage innovation, several incubation centers are being obtained all over the country like the ICICI Knowledge Park in Hyderabad; International Crops Research Institute for Semi-Arid Tropics; Centre for Innovation, Incubation and Entrepreneurship at IIM Ahmadabad; National Institute of Technology at Calicut, Society for Innovation and Entrepreneurship at IIT Mumbai; Vellore Institute of Technology. Some of the government initiatives taken are writing off research and capital expenditure in companies having in-house R&D centers, a 10-year tax holiday to R&D companies approved by DSIR, no import duty charged on import for equipment by public R&D institute, and 125% tax deduction on donation to research institutes carrying out social and statistical research.

4. Corruption in the System

   Most studies validate the fact that either democracy or autocracy does not considerably enable to combat corruptions. Corruption can only be prevented by greater accountability. In his keynote address at the Indian Independence day Celebration of 2005 conducted by a non-government organization Nandini—Voice for the Deprived at Chennai, Mr. N. Vittal,[1] former central vigilance commissioner said, "there are five basic reasons for corruption in India. (i) scarcity of goods and services; (ii) red tape and complicated rules and procedures; (iii) lack of transparency in decision-making; (iv) legal cushions of safety for the corrupt under the 'healthy' principle that everyone is innocent till proved guilty; and (v) tribalism among the corrupt who protect each other." The report of the Civil Services Examination Review Committee (October 2001), which was set up by the UPSC made the following observations:

> "It is very crucial to understand what happens to the values and integrity, motivation and other qualities assessed at the time of recruitment after 10 years and 20 years of service. It is said that initially many of the officers have positive values, but they change during the course of service. When they appear before the UPSC interview boards, most of the candidates are idealistic, bright, committed and sincere. However, once they join the service, within a period of time they seem to become cynical, negative and possibly even

[1] Vittal N., "Moral Values Must Prevail" in *The Tribune*, Chandigarh, Saturday, 24 September 2005, Special Supplement, p. 15.

> corrupt. Even the most outstanding officers feel frustrated after their idealism has been dimmed by the systemic realities. Some of them succumb to pressures easily. Therefore, a deeper insight into the systemic mechanism is required to ascertain the causes affecting this change and take remedial action."

Corruption in the society has resulted in failure of several social development initiatives, like Public Distribution System and the Mid-Day Meal Scheme. In a survey undertaken by Transparency International and a Delhi-based center for media studies, the value of corruption under PDS is whooping to Rs 375 crore per year. Kumar [16], in his extensive study of corruption in India, has indicated that implementation of The Prevention of Corruption Act [26] has been a failure in India. He was of the view that the right to uncorrupted service should be made a fundamental right, and the right for jurisdiction against violation of this right should also be a fundamental right. Corruption can be thought of as a violation of human rights as it has been established that only 17% of the fund allocated by the government for poverty reduction actually reaches to the needy [29] which is a great impediment to innovation for inclusive development. Citizens should be made aware of their rights and be made knowledgeable about government provisions which are meant for their development. The Majdoor Kisan Shakti Sangathan, an NGO, had initiated an awareness campaign and holds the government accountable for any corruption or mismanagement of developmental funds in many parts of the country.

Conclusion

India has an advantage of fast growing GDP, a large pool of English speaking widely respected engineers and doctors. What is required is a scientific temperament, quest for truth, and questioning mind which is the basis of Upanishad if it likes to innovate. Novelty will be developed if there is an infrastructure and ecology supporting youths of truth who think differently and require a platform for his experiment with truth. A strong sense of ethics has to be inculcated from childhood if we want to combat corruption which kills the youthful zest for service and change catalyst. India must capitalize on its strengths in case of alternate medicine and supercomputers if it intends to be a global leader in knowledge economy.

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