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India's Readiness on Innovation and Economic Growth: A Strategic Analysis

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Girish Srivastava ^α & Dr. S. Chatterjee ^σ

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I. INTRODUCTION

Gurudev Ravindranath Tagore said "the highest education is that which does not merely give us information but makes our life in harmony with all existence." India is pioneer in education, knowledge and learning since ancient times. India has contributed the world, the concepts of zero, decimal and Pythagoras theorem. Importance of education in the country had been established from 3 century BC. The country had created most advanced universities including Taxila, Vikramshila and Nalanda, which served as a melting-pot of knowledge attracting global students to learn mathematics, medicine, astrology, fine arts, philosophy and architecture.

A striking example of India's fore-sighted approach to education was Nalanda (5 to 13 century BC). This university emerged as the most prominent destination for higher education, not only for India but also for the neighboring South Asian region. The campus constituted eight colleges, including a multi-storied facility to accommodate the needs to the various courses on offer. The institute had well-charted curriculum in varied disciplines and also developed excellent educational infrastructure to provide a conducive environment for learning. Nalanda is an excellent example of a well - thought out holistic campus

constituting a residential cum institutional complex, accommodating around 10,000 students and teachers during its times.

Despite having a glorious past, India lacks in translating its innovation driven economy in last two centuries. India had created a fairly good number of institutes in higher education and also created infrastructure to provide education to the substantial number of students. The quality of the students graduated from these institutes was not adequate and need enhanced skill sets in order to count them as quality work force. The monitoring mechanism of higher education system needs thorough overhauling to provide desired objective of quality workforce. Regulatory framework should be strengthened to create effective accreditation process to ensure quality education from higher education organizations. India's educational system is passing through an interesting crossroad with numerous opportunities as well as unprecedented challenges to attain the goal of a knowledge based economy. India is faced with the challenge of not only creating infrastructure to meet this demand, but at the same time ensure quality. A holistic and in depth analysis of the existing education would be needed to understand various measures required to be made to evolve a road map for effective and efficient eco-system conducive for innovation driven economy.

This article has attempted to study the existing education system in India and analyze the short comings so that policy and strategy measures could be devised required to further strengthen the system to promote the innovation from the school level.

II. EXISTING EDUCATIONAL INFRASTRUCTURE

India has a vast higher education network. India is the third largest education system in the world after China and US as per the enrolment records. Renowned universities like Calcutta University, Visva Bharti University (Shantiniketan and Sriniketan), Banaras Hindu University, Allahabad University, Jamia Millia Islamia to name a few were established during the pre-independence era. Despite such a lineage, only a handful of higher education institutes (HEIs) have been able to make a global mark. The emergence of institutions in higher education has come up during post independence era, which thereby created a global impact as well as bringing prominence on the world map. Indian Institutes of Technology (IIT), Indian Institutes of

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Management (IIM), and Jawaharlal Nehru University were included in the list of the world's top 200 universities published by The Times Higher Education during 2005 and 2006. Moreover, Birla Institute of Technology and Science (BITS) - Pilani was listed among the top 20 science and technology schools in Asia by Asiaweek. The Indian School of Business (ISB), Hyderabad was at 15th position in global MBA rankings by the Financial Times of London in 2009, while the All India Institute of Medical Sciences (AIIMS) has been recognized as a global leader in medical research and treatment.

Though, higher education in India has recorded an impressive growth, the standards of a majority of institutes are, however, poor. Large number of small institutes is operating with un-viable models. Deficiencies of the system has resulted in the churning out of graduates lacking skill sets to find suitable employment despite acute shortage of skilled manpower in various sectors. An effort has thus been made to examine the possible options to create viable physical infrastructure for institutions offering higher education in this study.

India is a fast growing democracy. Having suitably skilled man-power is important to fuel the growth of the service sector. India is striving for a position of leadership, competing with economies of Brazil, Russia and China. To achieve this objective, the country has to ensure the development of adequately developed human resource to drive the economy and attain global excellence.

Education is a force that fuels global economies. Quality and quantity of the skilled manpower determine the competency of the society in the global market. Higher education is no longer a luxury; it is essential to national, social and economic development. Higher Education provides people with an opportunity to reflect on the critical social, economic, cultural, moral and spiritual issues facing humanity. It contributes to national development through dissemination of specialized knowledge and skills. Being at the apex of the educational pyramid, it plays a key role in producing quality teachers for the country's education. In the context of unprecedented need of explosion in knowledge, higher education has to be dynamic as ever, constantly entering uncharted areas¹.

The National Policy on Education-1986, revised in 1992 (NPE) stated that in Higher Education in general and Technical Education in particular, steps would be taken to facilitate inter-regional mobility by providing equal access to every Indian of requisite merit regardless of his origins. The universal character of Universities and other Institutions of Higher Education was to be underscored. Special measures would be taken in the areas of research and development and science and technology to establish network arrangements between different Institutions in the

country to pool their resources in such a way that participation in projects of national importance could be made accessible.

Approach paper of XII Plan indicated that there must be a strategic shift from mere expansion to improvement in quality higher education. The focus should be not only on larger enrollment, but also on the quality of the expansion. An additional enrollment of 10 million could be targeted, during the Twelfth-Plan period, in higher education equivalent to 3 million additional seats for each age cohort entering the higher education system. This would significantly increase the Gross Enrolment Ratio (GER) bringing it broadly in line with the global average.

III. PRESENT STATUS OF GROSS ENROLMENT RATIO IN HIGHER EDUCATION

Access to higher education is measured by GER in higher education, which measures the access level by taking the ratio of persons in all age group enrolled in various programmes to total population in age group of 18 to 23. Government has set a target of increasing the GER from the level of about 12% to 15% by the end of XI Five Year Plan and to 30% by 2020.

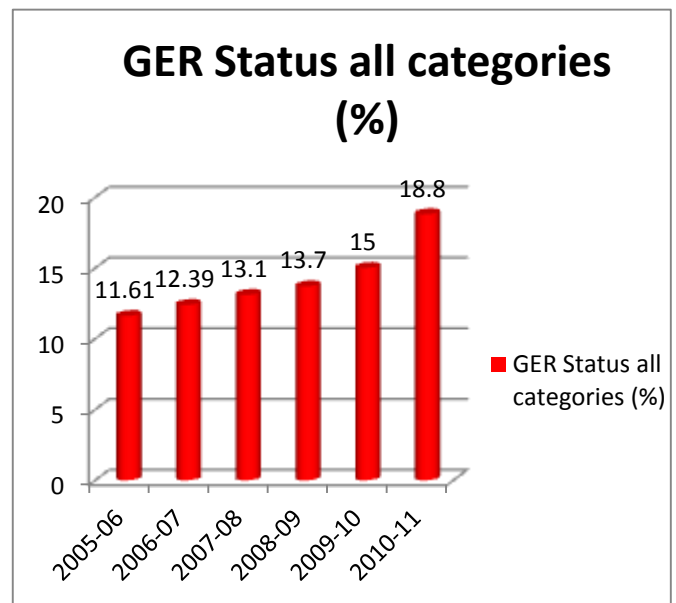


Figure 1 : GER Status

It may be seen from the Figure 1 that in Higher Education, the GER of the country has increased to 18.8% in 2011-12 from 11.55% in 2005-06 indicating increase of 6.45 % point². The phenomenal growth of 3.35 % point in GER has been witnessed between 2010-11 to 2011-12, which clearly show that higher education system is more or less on track and the trend required to be continued to achieve the target of 30% GER by 2020.

Table 1 : Structure of Education system in India

Age (yr)	Standard	Education	
5-6	-	Pre-primary	
6-14	I to VIII	Elementary Education	
		Formal	Non-formal
		Primary school and Upper primary school	
15-16	IX to X	Secondary Education	Technical Education/ITI
		Formal school	
17-18	XI to XII	Senior Secondary Education	Polytechnics
		Formal school	
Higher Education/ Undergraduate course			
19-23	XIII to XV	BA/BSC/BCOM/BED (3yrs) + PG Univ. (2yrs) & BE/BTECH, MBBS (4 yrs)	
> 24	> XVII	MTECH/MD/MS/PhD	
		Formal University	Open University

a) Structure of education in India

The Constitution of India underlines education as one of the fundamental rights (Constitution of India Part III, article 21) as per the 86th Constitutional Amendment Act. Education forms part of the 'concurrent list' of the constitution. Our education structure can be categorized into 3 heads: elementary, secondary and higher education (Table 1)³, which is commonly referred to as 10 + 2 + 3 model.

The government has introduced the Right to Education Bill, which mandates free and compulsory education for all children between ages of 6-14 years. The Constitutional Amendment Act, 2002 inserted Article 21-A in the Constitution of India to provide free and compulsory education of all children in the age group of six to fourteen years as a Fundamental Right in such a manner as the State may, by law, determine.

The Right of Children to Free and Compulsory Education (RTE) Act, 2009⁴, which represents the consequential legislation envisaged under Article 21-A, means that every child has a right to full time elementary education of satisfactory and equitable quality in a formal school which satisfies certain essential norms and standards. Every child shall be liable to pursue and complete elementary education. It will be the responsibilities of the government to ensure compulsory education to those children, whose parents are unable to pay the requisite expenses of the education. 'Compulsory education' casts an obligation on the appropriate Government and local authorities to provide and ensure admission, attendance and completion of elementary education by all children in the 6-14 yrs age groups. A rights based framework has thus been implemented that casts a legal obligation on the Central and State Governments to implement this fundamental child right as enshrined in the Article 21A of the Constitution, in accordance with the provisions of the RTE Act.

IV. FACTORS CONTRIBUTE TO THE EVOLUTION OF EDUCATION SECTOR

a) Growth of the services sector

India, after becoming a trillion dollar economy, has seen a gradual decrease in manual jobs and an increase in jobs requiring intellectual capabilities. The growth story overall and services of world and India began from almost the same level of around 4-5 % in 2000. But over the years, India's overall and services growth rates have outpaced those of the world. Interestingly, unlike world services growth, which has been moving in tandem with its overall growth with mild see-saw movements over the years, India's services growth has been consistently above its overall growth in the last decade except for 2003. Thus, this sector has been pulling up the growth of the Indian economy for more than a decade with a great amount of stability. The share of services in India's GDP at factor cost increased from 33.3 % in 1950-1 to 56.5 % in 2012-13 as per Advance Estimates. Including construction, the share would increase to 64.8 % in 2012-13.⁵

b) Demographic profile

The population in the age group ranging from 15-24 years constitutes approximately 19% of the total population of the country, making higher education an attractive proposition for the nation. India has a demographic advantage with 70% of its population between 10-60 years of age, unlike the developed economies where the population in the working age group is shrinking at an accelerated pace, leading to higher dependency ratios. As per the census of 2011, 31.2% of the population was below the age of 15. There is thus, a very strong domestic demand for higher education, which has contributed to the expansion of educational infrastructure on a large scale in diverse fields of science, engineering, architecture, management, technology and health care⁶.

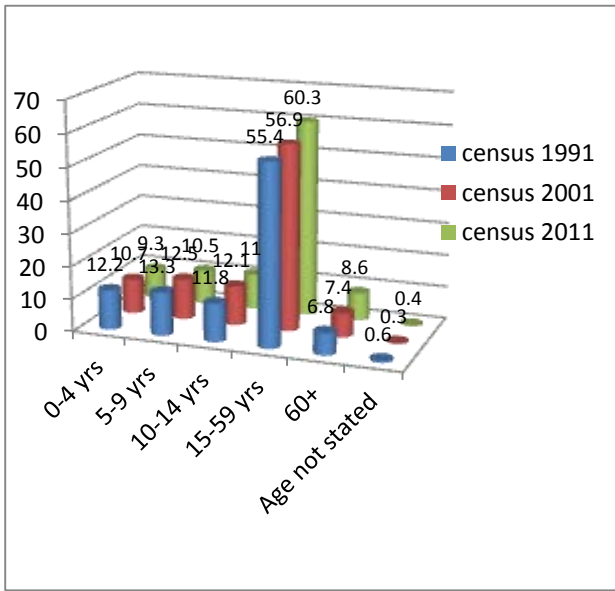


Figure 2 : Percentage of population in selected age groups⁶: 1991-2011

c) *Rising Income*

Rising income levels and increased purchasing power parity have together contributed in reducing the number of households in the lower income bracket of Indian society. The average household disposable income is likely to increase at a CAGR of 3.6% for the rural areas and 5.8% for the urban areas between 2005 and 2025. The average consumption in the mid income bracket (consuming and climbers category) is also expected to increase considerably with a CAGR of around 20% from INR1.8 trillion (INR180,0000 Millions) to INR11.1 trillion (INR1,110,0000 Millions) during the period of 2005 to 2015 in the urban areas⁷. On the other hand, the rural areas are likely to grow at only half the rate (when compared with urban areas) with a CAGR of around 10% from INR1.3 trillion (INR130,0000 Millions) to INR3.5 trillion (INR350,0000 Millions) during the same time period.

d) *Shortage of skilled manpower*

According to the estimates only quarter of all the graduates from Indian colleges are employable and about 80% of the job seekers are without professional qualification. The education system is not structured to produce students equipped with a skill-set that would be desirable in the job market. It is crucial for the education system to provide facilities to rectify this. During the Twelfth Five Year Plan, the intake of technical education institutions needs to grow at an estimated 15% annually, to meet the skilled manpower requirement of our growing economy⁸.

e) *Focus on Higher Education*

Higher education is critical for developing a modern economy, a just society and a vibrant polity. It

equips young people with skills relevant for the labour market and the opportunity for social mobility. It provides people already in employment with skills to negotiate rapidly evolving career requirements. It prepares all to be responsible citizens who value a democratic and pluralistic society. Thus, the nation creates an intellectual repository of human capital to meet the country's needs and shapes its future. Indeed, higher education is the principal site at which our national goals, developmental priorities and civic values can be examined and refined.

It is estimated that developed economies and even China will face a shortage of about 40 million highly skilled workers by 2020, while, based on current projections of higher education, India is likely to see some surplus of graduates in 2020. Thus, India could capture a higher share of global knowledge based work, for example by increasing its exports of knowledge intensive goods and services, if there is focus on higher education and its quality is globally benchmarked. The country cannot afford to lose time. The demographic bulge evident in India's population pyramid is encountering lower fertility rates, leading to a rapid slowdown in population growth rates and a looming decline of the population in the prime educable age up to 25 years within the next couple of decades^{7,8}.

Despite considerable progress during the Eleventh Plan, less than one-fifth of the estimated 120 million potential students are enrolled in HEIs in India, well below the world average of 26%. Wide disparities exist in enrolment percentages among the States and between urban and rural areas while disadvantaged sections of society and women have significantly lower enrolments than the national average. The pressure to increase access to affordable education is steadily increasing with the number of eligible students set to double by 2020⁹. At the same time, significant problems exist in the quality of education provided. The sector is plagued by a shortage of well-trained faculty, poor infrastructure and outdated and irrelevant curricula. The use of technology in higher education remains limited and standards of research and teaching at Indian universities are far below international standards with no Indian university featured in any of the rankings of the top 200 institutions globally.

V. GROWTH TRENDS

Higher education in India has experienced phenomenal growth of since independence. The Universities increased by 29 times, whereas, the Colleges have increased by 71times since the time of independence. Similarly, the enrollment has also registered tremendous growth. At the beginning of Academic year 2011-12, the total number of students enrolled in the formal system like Universities and Colleges, in Technical Education, Institutes and its

intake had substantially been increased¹⁰. The statistical overview of the higher education system, showed in Table 2, indicated the phenomenal growth in academic Institutions as well as in intake, enrolment etc. since independence¹¹.

Table 2 : Statistical Overview of Higher Education System Growth

No. of Institutions/ Enrolment	2010-11	2011-12
Universities	523	574
Colleges	33023	35539
AICTE approved Technical Institutions	11809	13507
Distance Teaching Universities/ Institutions	200	200
Enrolment in the Universities and Colleges(in Millions)	16.98	20.33
Enrolment in Open Distance Learning(ODL) System(in Millions)	3.745	3.856
Enrolment in Post School Diploma/PG Diploma(in Millions)	1.86	2.302
Intake in AICTE approved Technical Programmes (in Millions)	2.62	3.01

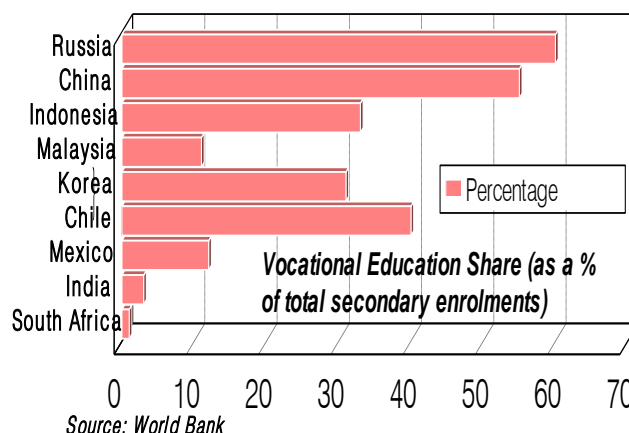
The growth of higher education in India since independence was substantial. The 20 Universities at the time of independence had increased by 29 times to 574, where number of Colleges (500) had enhanced to 71times (i.e. 35539)¹⁰.

At the national level vocational education in India comes under the purview of All India Council for Vocational Education (AICVE), under the aegis of Ministry of Human Resource Development (MHRD). AICVE is responsible for planning, coordinating and guiding the programme at the national level. The State Councils for Vocational Education (SCVE) functions state level. Vocational education in India refers to courses offered post secondary through a centrally sponsored scheme termed as "vocationalization of secondary education". The purpose of vocational education would be:

- Enhance individual employability
- Reduce the disparity between demand and supply of skilled manpower
- Provide alternatives for those pursuing higher education without particular objective or goal.
- There are around 6,800 schools (almost all under the public sector) offering vocational education. Around 4,00,000 students are enrolled in these schools. This enrolment utilizes merely 40% of the capacity of these institutes. The vocational education institutes are managing to attract a mere

3% of the 14 Million students in grades 11 and 12. These institutes offer over 100 courses in the field of agriculture, business and commerce, humanities, engineering and technology, home science, health and para medical skills¹².

Table 3 : International scenario of vocational secondary education



As compared to other countries the number of students entering vocational education in India appears to be rather low at 3% of the total secondary enrolments. In order to give a boost to vocational education, government proposed a scheme to target students, in the tenth five year plan that would include early school dropouts, skilled and semi skilled workers and unemployed youth of the country. The scheme provided for ITIs, polytechnics and the NGOs to deliver courses to these students. The informal sector contributes to nearly 59% of the GDP and employs nearly 91.4% of the work force¹³. This sector needs to be targeted for vocational training.

A major restructuring of the vocational education system is required to ensure that it responds efficiently to the needs of the growing economy like India. There is also a need to encourage private sector participation in management and curriculum design of the vocational education to bring about a system that allows graduates from these institutes to directly get absorbed in the labour market.

VI. INITIATIVES IN THE TWELFTH FIVE YEAR PLAN FOR HIGHER EDUCATION

The expansion undertaken in the Eleventh Plan had enhanced the rising aspirations of young people, improved schooling, jobs created with economic growth. It was realized that the skill-based technical change would require higher levels of education. Indian higher education moved from 'elite' to 'mass' higher education (threshold of 15% GER) during the Eleventh Plan, and the trend is now moving towards universal higher education (threshold of 50 % GER). It was felt

necessary to offer a wider, diverse range of education, where student should acquire skills in multiple disciplines along with a solid core set of skills. Further expansion will therefore require a re-examination of the design, organisation, definition, and purpose of higher education to embrace these needs.

The Twelfth Plan strives to create diverse education opportunities to cater to the growing number of students passing out of higher secondary classes on the one hand and the diverse needs of the economy and society on the other. Four key principles would, therefore, drive the strategy for higher education expansion in the Twelfth Plan. Firstly, expansion must focus on locations, States, subject areas/disciplines, and types of institutions where current capacity is low, instead of creating additional capacity across the board. Secondly, it was ensured that expansion must be aligned to the country's economy. A variety of HEIs offering innovative and relevant curricula, therefore, designed to serve different segments of the job market or provide avenues for self-employment must be developed. Specific emphasis must be given to the expansion of skill-based programmes in higher education.

Thirdly, the relative strengths of different types of institutions were harnessed to serve different needs. Central institutions were assisted to become quality-leading institutions. State institutions would support to expand further and simultaneously address equity issues and improve quality. The philanthropic sector was invited and incentivised to infuse more funds and build larger, sustainable and higher quality private institutions. New models of Public-Private Partnership (PPP) in higher education were encouraged not only for technology intensive education but also for multidisciplinary and research-based education. Open and distance-learning was used to widen access in a cost-effective and flexible manner. Fourthly, overall, expansion would carefully plan to provide better access to the poor and disadvantaged social groups and first generation learners from backward areas.

a) *Develop Central Institutions as Quality- Leading Institutions*

The salient features of Twelfth Plan initiatives as under:

- i. Enrolment in existing Central institutions would be targeted from 0.6 Million to 1.2 Million students. Central fund would be used to create only research and innovation based institutions or exemplar institutions.
- ii. Older Central institutions would be financially supported to redevelop campuses to achieve scale and build state-of-the-art facilities. In some cases, multiple campuses would be encouraged to enable economies of scale and institutional efficiency. The campuses were chosen for up-gradation to IIT-level

includes ISM Dhanbad, BESU Shibpur and NIFFT Ranchi. HEIs with potential credential in falling in the UTs under the administrative control of Central Government would also be upgraded. These institutes are PEC University of Technology and Chandigarh College of Architecture.

- iii. Enrolment in Central institutions would be role models for other institutions in all aspects including governance, infrastructure, faculty and curricula. They can help define new building technologies in infrastructural development, use of fixed-cost and time EPC contracts and PPP models for the basic infrastructure. They could assist other institutions to improve standards, especially in the States or regions where they are located. New Central institutions could build vibrant innovation clusters along with State and private institutions and other enterprises.
- iv. Central funding to State for higher education, its reach and its impact were insignificant. These funds were poorly being utilised in the past due to bureaucratic complicacy, inefficient monitoring and poor quality of outcomes. State higher education would get significantly more Central funding during the Twelfth Plan. Central funding would be done on a State-specific basis for higher education and to be allocated for the State's higher education system as a whole. The fund would however continue flow to individual universities and colleges via the University Grants Commission (UGC) as earlier. Allocation and flow of Central funds to State universities and colleges would be worked out through a consultative process. The UGC would play a strategic role in allocation and disbursal of Central funds, and also strategic investment plans as proposed by institutions on a selective basis.
- v. The strategic shift in Twelfth Plan includes enabling a State system-wide planning perspective and benefit from the synergy in spending by the Central and State Government. The States would develop comprehensive State higher education plans that utilise an interconnected strategy to address issues of expansion, equity and excellence together. Central funding would be linked to academic, administrative and financial reforms of State higher education. The funding to be provided through a flagship programme: Rashtriya Uchcha Shiksha Abhiyan (RUSA).

VII. GAP IN EDUCATION INFRASTRUCTURE

India has one of the largest higher education systems in the world, with 25.9 million students enrolled in more than 45,000 degree and diploma institutions in the country. It has witnessed particularly high growth in the last decade, with enrollment of students increasing

at a CAGR of 10.8% and institutions at a CAGR of 9%. India's higher education networks are also robust with over 25,000 colleges and 500 universities and university-level institutions. While the gross enrolment ratio (GER) has seen close to a seventy fold increase in the past six decades, the number of teachers has seen slightly over a twenty fold increase. This has resulted in a pupil to teacher ratio of 40, which is double the global average¹⁰.

However, despite the increase in enrolment, the GER at 18% in Eleventh Five Year Plan is still lower than the average for Asian countries at 22% and the world average at 23.2%. India is still way behind when compared to countries such as USA at 83%, Sweden at 82% and Norway at 80%. The Government intends to achieve enrollment of 35.9 million students in higher education institutions, with a GER of 25.2% at the end of the Twelfth Five Year Plan. These would be achieved through the co-existence of multiple types of institutions including research-centric, teaching and vocation-focused ones.

A historic increase in the total planned outlay in higher education has been allocated during the Twelfth Five Year plan to meet this colossal demand. Policies interventions such as the integrated township policy make the provision of education institutions mandatory. The manifestation of some education centric real estate formats have thus emerged. Some of such initiatives were "Knowledge clusters", e.g. Rajiv Gandhi Education city to foster a development of institutes with shared facilities, Lavasa, being developed as a "city with education as its back-bone". Information, communication and technology (ICT) is a welcome development considering the challenges in monitoring the quality of physical infrastructure. It has played a crucial role in dramatically increasing outreach without bearing the cost of construction or maintenance for physical infrastructure. Structured initiatives such as education development index monitor the progress of efforts under various schemes for schools.

In contrast, measures available to monitor the quality of higher education institutes are still limited. Nearly 40% of colleges under the purview of UGC do not receive any assistance as they do not fulfill the minimum quality requirement specified under section 12 (b) (for physical infrastructure and human resources). The UGC has set up the National Assessment and Accreditation Council (NAAC), which functions as an autonomous rating agency. Ironically, there is no regulation that mandates this accreditation, which to date remains a voluntary effort, initiated by the institute itself. These developments have brought India's educational status to an interesting crossroad with numerous opportunities as well as unprecedented challenges to attain the goal of a knowledge based economy. India is faced with the challenge of not only creating infrastructure to meet this demand, but at the same time ensure quality¹⁴.

VIII. CHALLENGES TO THE INDIAN HIGHER EDUCATION

India achieved 18% of Gross Enrollment Ratio (GER) during the Eleventh Plan period (2007–2012)¹⁵. At the beginning of the Plan period GER was 12.3%. The Government has also provided the desired thrust to boost higher education in its Five Year Plans. India's higher education system, however, faces challenges on three fronts¹⁶:

1. Expansion: India's GER of 18% was much below the world average of 27%, as well as that of other emerging countries such as China (26%) and Brazil (36%) in 2010.
2. Excellence:
 - Faculty shortage - 40% and 35% shortage of faculty in state and central universities, respectively.
 - Accredited institutions - 62% of universities and 90% of colleges were average or below average in 2010, on the basis of their NAAC accreditation.
 - Low citation impact - India's relative citation impact is half the world average.
3. Equity :
 - wide disparity exists in the Gross Attendance Ratio (GAR) and GER of higher education across states and in urban and rural areas and gender- and community-wise
 - Inter-state disparity - 48% in Delhi vs. 9% in Assam.
 - Urban-rural divide - 30% in urban areas vs. 11% in rural areas.
 - Differences across communities - 14.8% for OBCs, 11.6% for SCs, 7.7% for STs and 9.6% for Muslims.
 - Gender disparity - 15% for females vs. 19% for males.

IX. POLICY REFORMS TO ENCOURAGE INNOVATION

Improvement in higher education will boost the restructuring of academic programmes to cater to modern market demands; domestic and global linkages with employers and external advisory resource support groups. Greater emphasis on recruitment of adequate and good quality teachers and complete revamping of teaching methods by shifting from traditional repetitive experiments to open-ended design-oriented work for encouraging invention and research would be important policy measures. The compulsory interactive seminar-tutorials, broadening the content of Science and engineering programmes to strengthen fundamental concepts, improving learning opportunities and conditions by updating text books and learning material, and improving self-directed learning with modern aids and development of IT network would be other few key strategic measures would boost the conducive educational eco-system.

Several legislative initiatives have been initiated by the Government through reforms and policy measures to improve the eco-system. Following legislative proposals to reform in Higher Education are in active consideration¹⁷:

- i. Higher Education and Research Bill 2011:- The Bill would establish an over-arching authority called National Commission for Higher Education and Research for determining, maintaining and coordinating standards in Higher Education. The Bill was introduced in the Rajya Sabha on 28.12.2011. The Department related Parliamentary Standing Committee (PSC) had submitted its report on the Bill, which was under examination in the Ministry.
- ii. The Educational Tribunals Bill, 2011:- The Bill would provide a mechanism for adjudication of disputes involving stake-holders in the higher education sector including students, teachers, employees of higher educational institutions universities and institutions and statutory regulatory authorities, so as to reduce litigation in courts involving universities and higher education institutions. The Bill was examined for certain amendments to define the Central Educational Institutions. The requisite amendment was made to satisfy the definition indicated in the Central Educational Institutions (Reservation in Admission) Act, 2006. This Bill was introduced in Parliament on 3rd May, 2010 and was passed by the Lok Sabha on 26th August, 2010.
- iii. The Prohibition of Unfair Practices in Technical Education Institutions, Medical Educational Institutions, and Universities Bill, 2010:- This Bill would prohibit certain unfair practices of medical and professional educational institutions and universities to protect the interests of students and applicants seeking admission to such institutions and for allied matters. It would ensure the institution to mandatorily publish the relevant information on its website in the form of prospectus in addition to publication of a printed prospectus. This Bill would modify and amend the clauses relating to adjudication of penalties etc. by National Education Tribunal and State Educational Tribunals, so as to de-link the Bill from the Educational Tribunal Bill, 2010 and restore adjudication of penalties to civil courts. This Bill was introduced in Parliament on 3rd May, 2010 and was referred to the Parliamentary Standing Committee on Human Resource Development. Amendments made were a mechanism for redressal of grievances of applicants for admission, students, teachers and other employees of the higher educational institution and the time limit specified for the redressal of such grievances. It would be mandatory to disclose adherence to reservations provisions in public funded institutions and policy frame work in place in private un-aided institutions to account for addressing equity concerns. The Bill ensured punishments and penalties for nonadherence to the clauses.
- iv. The National Accreditation Regulatory Authority for Higher Educational Institutions Bill, 2010:- The Bill ensures mandatory accreditation of all higher educational institutions through accreditation agencies registered by a regulatory authority created for the purpose at the national level. It is also proposed that higher education institutions established by State Governments will apply to accreditation agencies owned and controlled by such State Governments only. This Bill was introduced in Parliament on 3rd May, 2010 and subsequently referred to Parliamentary Standing Committee on Human Resource Development (HRD). The composition of the Authority proposed under the Bill had been expanded by increasing the number of Members to 8 and providing representation to OBCs, minorities, SC, ST and women.
- v. The National Academic Depository Bill, 2011:- The Bill provides for creation of a National Electronic Database of academic awards and its maintenance by an authorized depository and has been introduced in the Lok Sabha on 5.9.2011 and was referred to the Parliamentary Standing Committee on HRD. The Report of the PSC has been received and official amendments are being finalized.
- vi. The Universities for Research and Innovation Bill, 2012: The Bill ensures the establishment and incorporation of Universities for Research and innovation to promote synergies between teaching and research and to create institutions universally recognised for quality in teaching, learning and research. The Bill was introduced in Parliament (Lok Sabha) on 21.05.2012. The Department related Parliamentary Standing Committee (PSC) has submitted its report on the Bill and the same is under examination in the Ministry.
- vii. The Foreign Educational Institutions (Regulation of Entry and Operations) Bill, 2010:- The Bill seeks to regulate of entry and operations of Foreign Educational Institutions, including technical and medical institutions, imparting or intending to impart higher education in India. The Bill was introduced in the Lok Sabha on 3.5.2010. Department related Parliamentary Standing Committee (PSC) has submitted its report on the Bill. Based on the recommendation of the PSC certain amendments has been carried out in the Bill which are under finalisation.
- viii. National Institute of Technology (Amendment) Act, 2010:- To make National Institute of Technology Act, 2007 more comprehensive and effective. Following amendments were proposed :-

1. Existing transitional provisions of the NIT Act, 2007 to be strengthened.
2. Representation to be given from nearby premier Central Institution in the Board of Governors of NITs.
3. 10 new NITs located in the States of Sikkim, Arunachal Pradesh, Manipur, Nagaland, Meghalaya, Mizoram, Uttarakhand, Delhi, Goa and Pondicherry to be introduced as Institutions of National Importance.
4. To amend the procedure for appointment of Deputy Director in NITs; and
5. To incorporate Indian Institutes of Science Education and Research (IISERs) in the NIT Act by making suitable provision in the NIT Act, 2007. The NIT (Amendment) Act, 2012 received assent of the President of India on the 7th June, 2012 and since then the 10 new NITs and five IISERs are functioning under the ambit of the NIT Act, 2007.
6. Indian Institute of Information Technology Bill, 2013: To ensure uniformity and autonomy in governance in respect of all the IITs, as also to declare them as institutions of national importance a Bill, namely, Indian Institutes of Information Technology Bill, 2013 has been formulated and introduced in the Lok Sabha on 18.03.2013. The Bill will be a novel experiment as both the Central Government institutions and the institutions recognises the need to develop new knowledge in information technology and to provide manpower of global standards development of industries set up in partnership with the State Government and industry are sought to be covered under a single legislation. It recognises the need to develop new knowledge in information technology and to provide manpower of global standards for the information technology industry which would in turn contribute to the development of industries.

X. CONCLUSION AND SUGGESTIVE MEASURES TO ADDRESS THE GAP AREAS

India is still at a nascent stage in comparison to many of its global peers in the field of innovation. The challenges being faced by the Indian companies in recent years require major transformation to generate innovative capabilities to excel better in the current era of the knowledge economy. Innovation in present context is about creation of new economic value with breakthrough ideas, which would be widely adopted. Innovation could perhaps evolve when love and passion are mixed with certain development. Steve Jobs could do that as he was intensely in love with calligraphy¹⁷.

India's traditional education system evolved from a risk-averse society, preferred comfort zones. The

system tends to be hierarchical and respectful socially to break out of well-trodden paths. Experts felt that physically Indian are poorly nutritious, habitant of pollution ridden and cramped spaces. Indian carries historical baggage, dwelling in past glories. These are however true for other Asian countries, which are far ahead of us in innovation. Indian is habituated to play safe and pursue well-defined paths rather than attempt new experimentation. It hardly accepts difference of opinion or the diversity in thought level. India could not yet harvest adequate experience from large-scale failures and success. In other successful nation, from every failure people see the capacity to make new progress¹⁷.

The promise of sustainable and inclusive innovation comes from start-ups and social enterprises, as they are more flexible, have higher risk-taking capabilities and are driven by passion. Innovation is happening in literature, music and performance arts attributed to the right brain. In last two decades, Indian literature, cinema and music had a huge upsurge and having global appeal and relevance. In the social and creative sectors, India is far ahead of industry because these sectors are able to take a longer view of time, and innovation requires time.

Unfortunately, in traditional Indian organizations always maintain hierarchies. Academic institutes, research organization, public sector and even most of the private companies always follow the stereo type bureaucratic processes, thus discourage change and hence deprived of innovative ideas. Application of better solutions meeting new requirements, inarticulate needs, and catering existing market demands requires innovation. This could be accomplished through evolving effective products, processes, services, technologies, or ideas that are readily available to markets, governments and society¹⁷.

India's higher education system requires to look into all these aspects. The forthcoming system should be better aligned to industry and global practices. The system needs more transparency and inclusive by the end of Twelfth Plan period. The Twelfth Plan initiatives are expected to create an enabling regulatory environment and effective implementation, monitoring and quality assurance mechanisms. Following would be suggestive measures to address the gap and challenges:

- a) *Merit-based student financing*: To ensure admissions to meritorious students independent of financial background
- b) *Internationalization of education*: To entail aligning different aspects of education (curriculum, faculty, etc) to international standards
- c) *More Fund to research and development*: India's R&D spending needs to be enhanced many fold. India's total R&D budget is less than \$3 billion

whereas General Motors alone has an annual R&D budget of \$10 billion¹⁸.

- d) *Encourage more researchers*: lower no. of students going for higher education and research.
- e) *Enabling a research environment*: To involve creating adequate means of research funding and practical application of research.
- f) *High quality faculty*: To create a conducive environment and provide incentives to attract and retain high quality faculty.
- g) *Improved technology for education delivery*: To leverage technology for enhancing the teaching-learning experience to ensure better outcomes.
- h) *Employability*: To ensure effective linkages of education-industry to ensure a highly employable talent pool.
- i) *Private sector participation*: Private sector has played an instrumental role in the growth of the education sector. Private institutions now account for 64% of the total number of institutions and 59% of enrollment in the country, as compared to 43% and 33%, respectively, a decade ago. The private sector can be expected to play an instrumental role in the achievement of these outcomes through the creation of knowledge networks, research and innovation centers, corporate-backed institutions, and support for faculty development.
- j) *Lack of faith and initiatives*: Indian software companies have been upgrading old products but not developing new lines and developing technology needs creation of culture that encourages risk-taking and innovation.
- k) *Poor implementation*: Lot of good ideas are available, however, implementation of these ideas and will power is lacking.

Disclaimer

The views expressed in this article are those of the authors and do not represent the official views of the Government of India. Article has been prepared in consultation with stakeholders from various Ministries, public and private companies, academic and research institutes, and also national and international experts. While the views and perspectives of stakeholders are reflected throughout the article, all analyses, findings and recommendations are solely those of the authors. The facts and figures, data used in this article are indicative and informative and are extracted from Annual Reports and sponsored Reports of the various Ministries, Industry associations etc. Validation of these data is challenging. Use of the data and recommendations are the responsibility of the users of the article.

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