

# Infrastructure in India: Challenges and the Way Ahead

Pradeep Agrawal



सत्यमेव परमो धर्मः

IEG Working Paper No. 350

2015

# Infrastructure in India: Challenges and the Way Ahead

Pradeep Agrawal



सत्यमेव परमो धर्मः

IEG Working Paper No. 350

2015

## **ACKNOWLEDGEMENTS**

I thank Shruti Tripathi and Durairaj Kumarasamy for excellent support in the preparation of this paper.

Pradeep Agrawal is Professor and Head, RBI Unit at the Institute of Economic Growth, Delhi, India.

email: [pradeep@iegindia.org](mailto:pradeep@iegindia.org)

# Infrastructure in India: Challenges and the Way Ahead

## ABSTRACT

Good social and physical infrastructure facilities are crucial for rapid economic growth, rapid human development, and poverty reduction. Thus, this study compares the levels of development of the social and physical infrastructure in India with those in other major emerging countries as well as developed countries. The study finds that India substantially lags behind other emerging countries in the access to and quality of health facilities, education, and vocational or skill training—probably a key reason why India has been so slow in eliminating poverty. Similarly, India's physical infrastructure also lags behind other emerging countries, especially in the sphere of electricity access and consumption per capita, internet access, level of air travel, and quality of sea ports. Given the urgent need for rapid development of our social and physical infrastructure, the study then tries to identify key challenges to infrastructure development and discusses some possible ways in which some of these challenges can be addressed.

Keywords: Growth constraints, poverty, infrastructure, education, health, shortcomings, challenges, solutions, India, emerging economies.



## 1 INTRODUCTION

A country's level of human and economic development is closely related to its levels of achievement in physical and social infrastructure. While physical infrastructure is an important determinant of domestic production, good social infrastructure is vital for human development as well as economic progress through better educated, better skilled, and healthier citizens.

Education and health are the main constituents of social infrastructure. Many studies document the contribution of education and health to economic development in which they are considered investments in human capital comparable to physical means of production, such as factories and machines. The economic attainments of Europe, North America, Japan, and East Asia are inconceivable without their attainments in human capital; hence, the importance of social infrastructure. Therefore, it can be surmised that investment in human capital through education, training, health, and medical facilities yields additional output and economic returns. Economic growth theory also sees human capital as an important source of economic growth. Further, to achieve rapid economic growth, it is essential that the population should be well educated and trained to be able to work effectively. It is also essential to reduce poverty. No amount of welfare measures can help a poor illiterate person the way education can by enabling him to become more productive and skilled. Therefore, effective education for the masses is crucial for reducing poverty and sustaining high rates of economic growth over long periods by providing a well-skilled labour force. The role of physical infrastructure in promoting economic development has been well-documented in the literature (Estache 2006; Sahoo and Dash 2008, 2009). Physical infrastructure not only contributes to enhance productivity, it also assists in the realisation of the potential ability of human capital and creates situations in which the potential can fully function. It also directly and indirectly contributes towards improving the quality and safety of people's lives. Within the scope of infrastructure, roads, railways, air transportation, seaports, electric power, and telecommunications and information technology (IT) are often used as services and intermediate goods essential for the productive processes of the manufacturing, agriculture, and services sectors.

In spite of some improvements in infrastructure in recent years, India still ranks 89<sup>th</sup> in basic infrastructure as per the Global Competition Report 2011-12. This indicates poor development compared to other countries of the world. The poor state of infrastructure, stretched to limits by the growing population and increasing regional and rural-urban disparities, implies that major improvement in physical and social infrastructure is absolutely essential to sustain further progress and high rate of economic growth. To meet this need for infrastructure improvement, the Government of India raised the investment in infrastructure from 4.7 per cent of GDP to around 7.5–8 per cent of GDP in the Eleventh Five Year Plan, and further plans to double the investment in infrastructure from INR 20.5 trillion to INR 40.9

trillion during the Twelfth Plan period, raising the share of infrastructure investment in GDP to more than 10 per cent. If these infrastructure investment plans are properly implemented, they can propel India's economic growth to a higher trajectory.

Given the importance of infrastructure in the economy, we compare the levels of development of the social and physical infrastructure in India with those in other major emerging countries as well as the developed countries (taken as a benchmark for achievement). We, then, try to identify challenges and shortcomings in key social and physical infrastructure sub-segments, including education, health, transportation, electricity, telecommunications, and information technology. We, next, discuss some possible ways in which some of these challenges can be addressed to help India achieve its infrastructure goals.

## **2 SOCIAL INFRASTRUCTURE: EDUCATION AND HEALTH**

Endogenous growth theory argues that both poor physical infrastructure and human capital can constrain economic growth (see Romer 1992). Social infrastructure such as education and health is essential to promote better utilisation of human resources and physical infrastructure, thereby improving economic growth and quality of life (Hall and Jones 1999; De and Ghosh 2003). For example, Hall and Jones (1999) argue that international differences in levels of output per worker are determined by differences in human capital and in physical and social infrastructure. Wagstaff (2002) notes that up to 1.7 per cent of annual economic growth in East Asia between 1965 and 1990 can be attributed to massive improvements in public education and health. Improvement in human capital could be critical for India in sustaining its service-led growth, which depends mainly on the availability of skilled manpower. Given this backdrop, there have been some efforts in recent years to improve both physical and social infrastructure facilities in India. To assess the impact of the government's efforts on social infrastructure, we discuss various indicators pertaining to education and health in the next two subsections and compare India's performance with that of other major emerging countries. Then, we try to point out challenges and shortcomings in these efforts and suggest various policy changes that can enhance education and health levels in India.

### ***2.1 Education***

India has a vast population of young people. Even after 66 years of independence, a surprisingly large proportion of our youngsters are not getting sufficient education or vocational training. On the one hand, this keeps a large number of them in poverty and misery for lack of productive skills; on the other hand, it reduces the rate of economic growth because of the lack of enough sufficiently skilled workers in many areas, which reduces our international competitiveness. Thus, India requires strong educational infrastructure to keep

pace with the growing economy and provide it with quality manpower. Education can accelerate economic growth and investment and is a key indicator to quality of life and the Human Development Index (HDI).

Over the past decade or so, both central and state governments have implemented new initiatives and increased spending to encourage greater enrolment and attendance at the school level. This has led to some improvement. Despite this, the performance of the education sector has been woefully inadequate. In April 2010, the Right to Education (RTE) Act was passed. With its implementation, the universalisation of primary (standards one to eight) education was given new impetus. The RTE Act makes education a fundamental right of every child between the ages of 6 and 14 and specifies minimum norms in elementary schools. It requires all private schools to reserve 25 per cent of seats for poor children (to be reimbursed by the state). It also prohibits donation or capitation fees. The RTE Act requires surveys that will monitor all neighbourhood, identify children requiring education, and set up facilities for providing it.

In higher education too, there is need to implement major reforms as rising affluence and aspirations spur strong demand for education at all levels and the traditional dominance of the public sector as a provider of education recedes. Now, the dual challenge is to build upon the progress made in improving participation and try to improve the quality of education, which remains poor. To meet these objectives, the reform momentum needs to be maintained and broadened, given especially the pace of development in the Indian economy, the changing needs of households and businesses, and the considerable lags between changes in education policies and outcomes.

Table 1 provides data on education sector characteristics measured by enrolment, literacy rate, pupil-teacher ratio, public spending, etc., to take stock of the current situation in India and compare it with international standards and achievements. First, we look at adult literacy rates. Even in 2011, India's adult literacy rate (only 63 per cent) was way behind that of China, East Asia, and BRCS countries (about 94 per cent) and developed countries (98 per cent). India's literacy rate gap with China and East Asia has stayed nearly the same for the last 10 years. The gap is narrower among the youth but still substantial-81 per cent for India but about 99 per cent for the rest of the emerging and developed countries. In addition to literacy rate, average years of schooling per adult is an important and commonly used indicator to measure educational attainment. It was only 4.4 years in India, about half of the average for other emerging countries (China at 7.5, East Asia at 8.5 and BRCS countries averaging 8.8 years) and even less than half of the developed countries (about 10.7 years of schooling per adult on average).

**Table 1 India and the World: Comparison of the Access to and Quality of Education**

Indicators	Year	India	China	East Asia	BRCS	Developed
Countries						
Literacy rate, adult total (per cent of people ages 15 and above)	2010-11	62.8	94.3	94.9	93.2	98.3
Literacy rate, youth total (per cent of people ages 15-24)	2010-11	81.1	99.4	98.5	98.6	99.5
School enrolment, primary (per cent gross)	2010-11	112	111.2	104.5	112.5	104.7
School enrolment, secondary (per cent gross)	2010-11	63.2	81.4	82.0	92.4	104.1
School enrolment, tertiary (per cent gross)	2010-11	17.9	26.8	49.0	35.9	67.7
<i>Average years of schooling</i>	<i>2010-11</i>	<i>4.4</i>	<i>7.5</i>	<i>8.5</i>	<i>8.8</i>	<i>10.7</i>
Public spending on education, total (per cent of GDP)	2010-11	3.3	-	4.3	5.3	5.2
Public expenditure per student, primary (per cent of GDP per capita)	2010-11	7.3	6.0	15.9	53.2	21.4
Public expenditure per student, secondary (per cent of GDP per capita)	2010-11	13.8	11.5	17.3	45.7	26.9
Public expenditure per student, tertiary (per cent of GDP per capita)	2010-11	69.8	90.0	23.3	47.7	26.3
Pupil-teacher ratio, primary	2010-11	30.2	16.8	19.4	21.7	15.8
Pupil-teacher ratio, secondary	2010-11	25.3	15.2	20.2	16.3	13.3
Research and development expenditure (per cent of GDP)	2010-11	0.8	1.7	0.95	1.34	2.6
Researchers in R&D (per million people)	2010-11	136	863.0	1265.8	263.0	4269

Source: World Development Indicators, 2012

These poor outcomes are partly due to low levels of public expenditure on education and partly due to weak institutions and governance. Thus, public expenditure on education as a fraction of GDP was again lower at 3.3 per cent in India as compared to 4.3 per cent in East Asia and about 5.3 per cent in BRCS and developed countries. Similarly, expenditure per student as a percentage of GDP per capita in primary and secondary education was significantly lower in India at 7 per cent and 14 per cent but many times higher in BRCS and developed countries (though not in China). However, the expenditure on students in the tertiary sector is significantly higher in India than in East Asia, BRCS countries, and even developed countries (with China even higher than India). This seems to be the result of continuing practically free education even at the tertiary level in India and China while the costs go up sharply. It, however, seems a misplaced subsidy, since the benefit goes largely to the middle and upper classes rather than the poor. Instead, the urgent need in India is to expand the tertiary education opportunities (even if it means raising its costs to some extent) and to improve the institutional structure to better reward excellence, which seems to be taking a backseat.

Despite public expenditure not increasing much as a proportion of GDP, it has increased in real terms, as the real GDP has more than doubled over the past decade, and there have been some efforts at increasing enrolment and access to education. There has also been a court-mandated free mid-day meal scheme for children in elementary schools (standards 1 to 8). These have contributed to a significant improvement in enrolment rates in elementary education: the gross enrolment ratio (number of students as share of all children of the relevant age group) grew from 94 per cent in 2001 to 112 per cent in 2011. (The number can exceed 100 per cent due to the presence of older children or adults in lower classes.) This number looks large, and is so—in comparison with all the other groups of countries—but the transition has been very slow. For example, the gross primary enrolment rate in China has exceeded 100 per cent since 1985, but India reached that figure only in 2000.

The enrolment rate in secondary education (standards 9 to 12) was about 45 per cent for India in 2000 and has increased since then, but was still only around 63.2 per cent in 2011. This compares to average figures of about 85 per cent for other emerging countries and 104 per cent for developed countries. The tertiary enrolment rate has increased from 9 per cent in 2000 to 18 per cent in 2011. This compares to average figures of about 37 per cent for other emerging countries and 68 per cent for developed countries. Thus, while there has been some progress in India over the past decade, more needs to be done as enrolment at the secondary and tertiary level remains low by international standards, particularly the latter.

The teaching staff represents a vital aspect of education. The pupil-teacher ratio (PTR) is one of the critical indicators of education and may provide insight to measure its quality. The table reveals that the PTR is quite low at the primary and middle levels—figuring at 30.2 and 25.3, respectively—about twice that of China and other groups of countries, and needs improvement. Thus, it is imperative to improve PTR and to strengthen the institutional framework of the schools and colleges to enhance quality of education and to make human resources globally competitive.

Growth in private institutions has been significant during the Eleventh Plan period, with 98 private state universities, 13 private deemed universities, 6,335 private colleges, and 2,321 private diploma institutions being set up during this period. In 2012, 28.3 per cent of all primary students (age group 6–14 years) enrolled in schools attended private schools, in comparison to 18.7 per cent in 2006. Most institutions of secondary and higher education are driven by the private sector; private institutions make up 60 per cent of all secondary schools in 2010-11, and 63 per cent of all higher education institutes with 52 per cent of the share of students in 2010. The privatisation of the education sector is adding to the financial burden on the overburdened lower and middle-income families.

However, in spite of the significant progress made during the past few years, India's education sector is still plagued with several challenges, e.g., its relatively low GER,

inequitable access to higher education by community, gender and geography and lack of high quality research and education institutions, resulting in sub-optimal outcomes. Another serious shortcoming has been the failure to ensure good quality elementary education. While all academic facilities in the school such as library, teaching, learning material, and so on have a significant influence on the quality dimension, there is very limited systematic and specialised data on how much children learn in schools. However, studies indicate that states are rushing to achieve enrolment targets but providing substandard education in the process. The results of a recent effort to assess learning achievements facilitated by Pratham, an NGO, highlight the poor state of affairs. In its Annual Survey of Education Report (ASER) Rural, 2012, children were assessed on three bases—reading and comprehension ability in native language and in English and ability in basic arithmetic (Table 2). Across rural India, the percentage of children who could read standard 2 books was only 10 per cent of standard 2 students, 47 per cent of standard 5 students, and only 76 per cent of standard 8 students. As many as 51.1 per cent children enrolled in standard 5 could not read even simple English words, and as many as 77.5 per cent could not read simple English sentences. Among all children enrolled in standard 8, 53 per cent could not read simple English sentences. Coming to mathematics, 55.6 per cent of standard 2 students could not even recognise two-digit numbers (10-99), and 75.2 per cent of standard 5, and as many as 51.9 per cent of even standard 8 students could not do simple division problems.

**Table 2 Assessment of Children's Reading and Numeric Skills in Rural India**

Standard	Cannot read words in native language	Cannot read standard two text	Cannot read simple words in English	Cannot read easy sentences in English	Cannot recognise numbers 10–99	Cannot divide
2	43.8	89.9	81.1	93.8	55.6	97.2
5	83.4	53.2	51.2	77.5	17.9	75.2
8	94.3	23.6	26.7	53	6.2	51.9

Source: Pratham, Annual Survey of Education Report (ASER), 2012

Not only is the quality of education for the masses shockingly bad, it is getting worse over time. Comparing the cohort of children who were in government schools in standard 5 in 2011 with the cohort in standard 5 in 2012, there is evidence of a drop of more than 10 per cent in almost all states in the ability to do basic subtraction. The proportion of all children enrolled in standard 5, who could not do division problems, has increased from 63.8 per cent in 2010 to 72.4 per cent in 2011 and further to 75.2 per cent in 2012. In 2010 nationally, 46.3 per cent of all children in standard 5 could not read a standard 2 level text on their own language. This proportion increased to 51.8 per cent in 2011 and further to 53.2 per cent in 2012.

This reflects, among other things, teachers' inability to explain even simple concepts so that students understand. It is also reported that school dropout rates are highest in early grades. This indicates the need for dramatically improving the teaching-learning methods adapted in standards 1 to 5 so that students attain at least basic reading and numeric skills failing which ensuring standards in higher grades becomes difficult.

Further, the quality of learning is equally bad across all levels of the education system. All surveys unanimously point to extremely poor learning outcomes across the board. Urban schools are not significantly better than rural schools and the vast majority of private schools are not much better than government schools. While about half the primary school students are three classes below the levels they ought to be in reading and even more in arithmetic. These appalling outcomes continue or are even exacerbated at the secondary and higher levels. High school children do not have basic conceptual understanding. Students entering the workforce have very low employability. Clearly, raising the quality of education is the biggest challenge in our educational system. An urgent action is needed in this regard, including redesigning the basic institutional framework of schools and colleges and creating greater accountability.

### *Higher education*

The emphasis in the past decade was on enhancing supply and increasing access to higher education. Consequently, the Indian higher education witnessed particularly high growth in the last decade, with the number of institutions growing at 9 per cent per annum and the enrolment of students growing at 10.8 per cent per annum. Table 10.3 provides detailed data on the expansion of higher education in India over 2000-12. The GER for higher education (both degree and diploma programmes) as a percentage of the population in the eligible age cohort of 18-23 years has increased from 13.1 per cent in 2007-08 to 18 per cent in 2011-12. Even though our higher education system is one of the largest in the world, the GER is far below the average for emerging and developed economies. Increased enrolments in the Eleventh Plan have enabled Indian higher education to cross the threshold of 15 per cent GER, moving the country from an 'elite' towards a 'mass' higher education system. Despite this growth, the unmet demand for access to higher education remains significant, indicating that access to higher education needs further expansion. Even though the national level GER is 20 per cent, there are wide inter-state variations. Delhi, Chandigarh and Puducherry, which attract a large number of students from outside their states, have GERs exceeding 25 per cent, while states like Bihar, Jharkhand, Assam, Rajasthan, Orissa and West Bengal have significantly lower GERs. This suggests a need for state-specific strategies in addressing issues of expansion of higher education during the Twelfth Plan period.

When we look at other characteristics of the higher education system, we find that it lacks on other fronts as well. For example, the Planning Commission estimates faculty

shortages of about 40 per cent in state universities and 35 per cent in central universities, respectively. It also faces lower enrolment of female students over male students and lower enrolment of lower caste, Muslim, scheduled caste and scheduled tribe students over those from the general categories.

**Table 3 Expansion in Higher Education in India, 2000-12**

	2000- 01	2006- 07	2011- 12
Number of Universities	256	387	659
Number of Colleges	12,086	21,170	33,023
Student Enrolment Colleges/Universities (in million)	8.4	16.6	25.9
GER (Gross Enrolment Ratio) of Colleges and Universities ( per cent)	10	12.3	17.9
Number of Distance Education Institutions	74	144	197
Student Enrolment in Distance Education (in million)	1.38	2.74	4.2

The quality of higher education is also a major issue. Barring a few Indian Institutes of Technology, which are ranked 50<sup>th</sup> to 100<sup>th</sup> worldwide in various rankings, no Indian university or institute is listed among the top 200 universities/institutions in the world. Around 62 per cent of universities and 90 per cent of colleges in India were average or below average in 2010 on the basis of their NAAC accreditation. India's relative citation impact is as low as half the world average. Part of the problem lies in the weak institutional structure and in poor evaluation and promotion procedures where excellence in teaching or research does not get rewarded sufficiently and the teaching staff does not have much stake in teaching outcomes or student performance.

Despite the significant progress made during the past few years, India's higher education sector is still plagued with several challenges, e.g., its relatively low GER, inequitable access to higher education by community, gender and geography, and lack of high-quality research and education institutions, resulting in sub-optimal outcomes.

#### *Vocational education and training (VET)*

Vocational education and training (VET) consists of practical courses through which one gains skills and experience directly linked to a career and employment opportunities. These training courses are parallel to other conventional courses of study (like B.Sc., M.Sc., etc) and give students some work-related experience, which many employers look for. However, considering the availability of manpower, high unemployment rates and need to create more employment opportunities, VET (except in computer-related courses) is surprisingly underdeveloped in India.

Vocational training institutions can be categorised into (a) government, (b) local body, (c) private aided, (d) private unaided, and (e) not known. According to an NSSO report (2009-10), only 10 per cent of persons aged 15-29 years received vocational training, only 2 per cent of them received formal training, and only 3 per cent of those formally trained are employed. Computer-related training is most sought after. Vocational training is imparted mainly by (a) public Industrial Training Institutes (ITIs) and (b) privately owned Industrial Training Centres (ITCs).

According to the Planning Commission Report for the Eleventh Five Year Plan, there are about 5,114 ITIs imparting training in 57 engineering and 50 non-engineering trades. Of these, 1,896 are state-government-run ITIs, while 3,218 are private. The total seating capacity in these ITIs is a mere 7.42 lakh (4 lakh seats in government ITIs and the remaining 3.42 lakh in private ITCs). However, only 20 per cent of formal vocational training is received from ITI/ITCs.

Though there is a growing demand for vocationally trained workers, the segment per se has not really picked up in India because of a variety of reasons. One is that vocational education and training for manual or industrial jobs were perceived as low paying and meant for the lower strata of society. Good trainers have always been an issue with vocational education in India. Because of societal pressures, the segment has failed to attract good mentors. The salaries of teachers in VET have been at the lower end of the spectrum and this may have also discouraged some teachers.

In some states, the course curriculum has not been updated for 20 or more years, so even if students have completed VET qualifications, they may not be employable in modern industry. Of the trained candidates, the labour market outcomes as seen from placement/absorption rates are reportedly very low, perhaps due to the outdated curriculum of VET courses.

There is an urgent need to expand vocational training in India in a big way and to make it more oriented to current labour market needs. As the Indian economy becomes knowledge-based, new and revised courses that fulfil the requirement of modern industries become all the more imperative. Thus, the private sector, which is more adaptable in this respect, should be allowed and supported to play a larger role. Public-private partnership can also be a good option in this sector. In addition to the degree and diploma programmes in vocational courses, we also need shorter and more informal training facilities. In fact lower level vocational training in fields like carpentry, masonry, plumbing, electrician, electrical and electronic goods repairs, basic computer related training, etc., could easily be offered in schools (perhaps after normal school hours and extended to non-students alike) to all those with basic education as per the course requirement. This may be particularly suitable for rural areas and smaller towns where the share of students being able to go to degree colleges is limited and could create a lot of semi-skilled manpower at very low cost.

### **2.1.1 Key challenges in education**

#### *Investment in public education still limited*

The Government of India spends far less on education than other emerging and developed countries and less than even its own assessment calls. For example, the Central Advisory Board on Education (reconstituted by the Government of India in 2004) has consistently argued that average annual expenditure on education from the public exchequer has to be in the range of 6 per cent of GDP, at least half of which should be for primary and secondary schools.

#### *Elementary education still not universal*

While close to 93 per cent net enrolment ratio (NER) children in the 6-11 age group are formally enrolled in primary schools, nearly 40 per cent drop out at the primary stage. About 38.41 per cent boys and 51.88 per cent girls in the 6-14 age group are not attending school. The enrolment ratios of scheduled castes and tribes (SC, ST) and Muslim children still remain far lower than the national average, even more so for girls.

The most socially disadvantaged in most rural areas have been allocated single-teacher, single classroom Education Guarantee Scheme (EGS) kind of schools where dysfunctional education including frequent teacher absenteeism and poor infrastructure discourages students and leads to large share of dropouts.

Further, there are still significant costs that the poor have to bear even in government schools where tuition is generally not charged. Families have to still pay for uniforms, stationery, transport, etc. Poor school infrastructure, lack of things like toilets, safe drinking water in the schools, poorly paid teachers burdened with multiple tasks and little accountability and hardly any stakes in the system, frequent teacher absenteeism, and generally poor level of governance add to the misery of the children and to high dropouts.

Thus, the data in Table 4 shows that while the NER in primary (standard 1-5) was about 93 per cent, it dropped sharply to 62 per cent in upper primary, even in 2011. Nonetheless, the table also gives hope for the future, since the NER for upper primary has increased considerably, from 48 per cent in 2006-07 to 62 per cent in 2010-11, an additional 167,000 schools have been established, and an additional 590,000 teachers employed in government-run schools over the same period. We should certainly aim for near universal education up to standard 8, and then standard 10.

**Table 4 Progress in Net Enrolment Ratio (NER) in elementary education**

		2006–07	2009–10	2010–11
NER: Primary (standard 1-5)	(%)	93	94	93
NER: Upper primary (standard 6-8)	(%)	48.4	58.3	61.8
No. of schools	(000s)	1,195	1,304	1,362
Teachers in govt. school	(000s)	3.600	3.900	4.190

Source: UNESCO, <http://www.uis.unesco.org/DataCentre> and Ministry of Human Resource Development, Govt

### *Education quality remains low*

Notwithstanding the rapid gains in enrolment and attendance, average levels of educational attainment and basic skill acquisition, including reading, writing and basic arithmetic, remain very low by international standards. Over time, the stock of educated workers will rise. However, cognitive skill formation, rather than education attainment per se, is what matters the most for both the earnings potential of the individual as well as their contribution to economic growth at the aggregate level (Hanushek and Woessmann 2008). The extent to which increases in participation translate into improvements in skills and ultimately better social and economic outcomes will depend heavily on the quality of education provided. As participation rates continue to rise, the priority will need to shift to focus on learning outcomes of students.

To summarise, while the central and state governments have been devoting substantial funds and public effort towards provision of education, these efforts have not been adequate nor have they yielded the desired results. The aspects of policy failure could be categorised as follows:

- a. Attention to the challenges posed by the rapidly increasing population has been inadequate.
- b. Delivery mechanisms are poorly designed.
- c. Implementation of policies and schemes is poor.
- d. Appropriate institutional mechanisms to bridge need gaps are absent.
- e. Institutions do not appear to be adequately answerable for the failure of the delivery system.

### **2.1.2 Overcoming the challenges in education**

Some ways to help overcome the challenges in education are listed below.

### *Improvement in infrastructure and institutions*

Improvements are not possible if the quality of physical infrastructure is poor, but they are even more unlikely if institutions are weak. Studies reveal that the public infrastructure for both education and healthcare in India is of poor quality and very inadequate to meet the full demand. Therefore, improvements can be brought about by expanding facilities and improving the delivery mechanism.

### *Offer school health programmes*

Along with mid-day meals, health programmes should also be introduced in schools to cover basic healthcare including de-worming and iron supplementation. The World Health Organization (WHO) has identified worm infections as the greatest cause of disease among 5-14-year-old children, and programmes ensuring health of students increase school attendance and raise scores on tests of cognition or school achievement.

### *Educating girls and mothers*

Educating girls and mothers leads to sustained increases in education attainment from one generation to the next. It can change a society from one in which not sending one's children to school is socially acceptable into one in which the expectation is that every child completes school. Multiple studies find that the mother's education level has a strong positive effect on children's enrolment—significantly greater than the effect of the father's education level. Also, the mother's education level has a stronger effect on daughters' enrolment than on sons' enrolment.

Increasing girls' educational attainment is essential to fulfilling education's potential for positive social transformation. Given the barriers to girl's education, specific interventions are needed to make schools more accessible and secure for them. Providing female teachers for girls, decreasing the distance to school, and providing toilets in the school may address some security concerns.

### *Address special needs*

It is also important to go beyond averages and disaggregate results by region, gender, ethnic group, and socioeconomic status to identify weaknesses within a particular segment of the population. This will help in formulating directed policies aiming to bring improvement in the identified segments such as Dalits, Muslims, people with disabilities, etc.

### *Evaluate learning outcomes*

The ability to measure what the education sector produces—that is, learning outcomes—is weak. Instead, the focus is typically on the number of children in seats or even children's

names on class rosters. The Indian education system should be subjected to full international learning assessment, which provides international comparability. We will be able to improve by comparing ourselves with better countries and reviewing the fields where we lag behind.

#### *Create better institutional mechanism for more effective delivery*

The institutional mechanism does not seem to be functioning well and needs major overhauling and improvement. Teachers and higher management officers have to be made more accountable for actual delivery and students' performance.

#### *Challenges in higher education*

The higher education sector also needs improved management and a major expansion in capacity—through the establishment of new colleges and universities. The quality in existing colleges must be improved by increasing salaries, promoting research, and encouraging private participation. Access must be ensured for all deserving students through scholarships, and distance education must be promoted. Reform in professional education is crucial in building a knowledge society. Therefore, to promote quality, governance needs to be reformed, curricula revised, and accreditation mechanisms developed. Colleges should provide credit and non-credit courses in the form of employment-oriented programmes.

## **2.2 The Healthcare Sector**

Despite some improvements over the last decade or so, India's healthcare infrastructure is woefully inadequate and has not kept pace with the country's requirements. While India has several centres of excellence in healthcare delivery, these facilities are limited in their ability to drive healthcare standards because of the poor condition of the infrastructure in the vast majority of the country. This is reflected in the numbers of physicians per 1,000 persons, which has hardly risen from 2,000 and remains rather low at only 0.65 compared to 1.8 in China, 2.2 in BRCS and 2.8 in developed countries (Table 5). The situation with the number of hospital beds per 1,000 persons is even worse at 0.9 in the year 2011. These numbers are about four times smaller than that in China, East Asia, and BRCS countries. It is, therefore, not surprising that India's life expectancy at birth at 61.6 years is considerably lagging behind not only the average for developed countries (78.5 years), but also BRCS (65.4 years), East Asian countries (70.6 years), and China (70.6 years). The main reason for the formidable challenges faced by the healthcare system in India is low public spending on public health, which is much below what is required. Between 1996–97 and 2005–06, total government spending on health was stagnant at about 1 per cent of GDP, and the public expenditure elasticity with respect to GDP was at 0.94 per cent, lower than the average for low-income countries (1.16 per cent) for the same period (Tandon and Cashin 2010). Despite efforts to increase public spending after 2005-06, including the adoption of the National Rural Health Mission (NRHM), under which spending on healthcare is expected to increase to 2-3 per cent of GDP, the actual expenditure has actually declined slightly from 1.3 per cent of GDP in 2000

to 1.2 per cent of GDP in 2011. This compares with 2.2 per cent of GDP being spent on public health expenditure in East Asia, 2.9 per cent in China, 3.7 per cent in BRCS countries, and a whopping 8.7 per cent in developed countries. This has resulted in poor quality of preventive care and poor health status of the population. The inadequate level of public health provision in India has forced its population to seek private health providers, resulting in high out-of-pocket spending, which is over four times higher than the public spending on healthcare.

**Table 5 Health Indicators for India and Other Emerging and Developed Countries**

Indicators	Year	India	China	East Asia	BRCS	Developed
Life expectancy at birth, total (years)	2011	66	75	73.5	67.1	80.5
	2000	61.6	71.2	70.6	65.4	78.5
Physicians (per 1,000 people)	2011	0.65	1.82	0.99	2.2	2.8
	2000	0.6	1.1	0.61	1.7	2.6
Hospital beds (per 1,000 people)	2011	0.9	4.2	3.8	4.7	7.02
	2000	0.6	2.5	2.3	5.3	7.9
Health expenditure, public (per cent of GDP)	2011	1.2	2.9	2.2	3.7	8.7
	2000	1.3	1.8	1.6	2.8	6.7
Health expenditure, public (per cent of government expenditure)	2011	8.1	12.5	9.9	11.0	18.4
	2000	3.9	11.1	7.5	9.7	16.2
Health expenditure per capita, PPP (constant 2005 international \$)	2011	141.0	432.0	677.6	933.4	4679.6
	2000	69.4	107.0	272.9	380.5	2741.9
Improved water source (per cent of population with access)	2011	91.6	91.7	94.0	94.4	99.5
	2000	81.0	80.0	89.8	88.8	99.2
Improved water source, rural (per cent of rural population with access)	2011	89.5	84.9	89.9	85.2	97.5
	2000	77	70	82.2	76.0	97.1
Improved sanitation facilities (per cent of population with access)	2011	35.1	65.1	84.4	72.6	99.8
	2000	25.0	44.0	79.0	66.3	99.5
Improved sanitation facilities, rural (per cent of rural population with access)	2011	23.9	55.8	80.7	55.1	99.3
	2000	14.0	35.0	74.0	48.8	98.1

Source: World Development Indicators, 2012

Not just medical facilities but even drinking water supply and especially sanitation in India continue to be inadequate, though there is some improvement. The share of Indians

with access to improved sources of water has increased from 72 per cent in 1990 to 81 per cent in 2000 to 91.6 per cent in 2011. Although these numbers do not look so bad by international comparison (averaging from 91 per cent for China to 99 per cent for developed countries; see Table 5), it has to be noted that even those with access to improved water in India typically get water for only a few hours a day (only two Indian cities have continual water supply) and even the 'improved source' is often not entirely safe for drinking.

However, it is the level of sanitation that is a real cause of concern and requires major effort by various levels of government and communities for improving coverage. Thus, at the national level, improved sanitation facilities were available to only 17 per cent of population in 1990, 25 per cent in 2000, and even in 2011 it was only at 35 per cent (compared with about 70 per cent in other emerging economies and 99 per cent in developed countries; see Table 5). Poor sanitation is particularly dangerous to health, as it is very likely to lead to infection of water sources and water supplies reaching the poor—leading to a large number of waterborne diseases like diarrhoea, cholera, typhoid, etc. (endemic in India) and endless health problems including poor absorption of nutrients from food. This leads to a large number of health problems for the poor. Combine this with highly inadequate public health facilities and you get the nightmare that the poor in India face—poor health, malnutrition, frequent infections, and resulting acute medical and financial distress. Thus, poor sanitation facilities (lack of toilets, poor waste disposal) are a major source of misery for the poor and in very urgent need of serious attention from all levels of government (local, state, and national). Additional financial and managerial resources need to be provided for this are needed, as India's level of investment in water, sanitation, and public health has been low by international standards.

### **2.2.1 Key challenges facing the health sector**

Health services in India are characterised by (a) inadequate and inferior infrastructure; (b) poor public service delivery; (c) lack of quality choices for consumers; and (d) lack of access especially for the poor due to a high dependence on relatively expensive privately provided services. In this sub-section, we discuss some challenges that the health sector faces, and how they undermine the expected impact.

#### *Public expenditure on health too low*

The WHO calls for a 7.5 per cent allocation of GDP for health. Today, India allocates only about 1 per cent, less than even Nepal and Thailand, and reaching its avowed target of even 3 per cent of GDP seems difficult. Western countries allocate 6 per cent and above to their health sectors. Calculations by the United Nations show that India's spending on public health provision as a share of GDP is the 18<sup>th</sup> lowest in the world.

### *Adverse impact of user fees and privatisation of health services*

Possibly the single largest cause of putting health services out of the reach of the poor is the introduction of user fees in public hospitals by the government (user fees keep expanding into admission fee, pathological tests and diets, and follow different patterns across states). Since 1990, privatisation of the health sector, and the penetration of the market into the sector, has had damaging consequences for the poor. Rising costs are greatly limiting their access to health services.

### *Focus on women is needed*

Patriarchal functioning has ensured that health for women normally means maternity services, excluding basic health services that lie at the root of many a problem. Along with gender budgeting, services need to be integrated into a comprehensive primary healthcare system as conceived by the Alma Ata Declaration. According to the latest National Rural Health Mission (NRHM) surveys, more than 50 per cent women of this country are anaemic; and 40 per cent of the maternal deaths during pregnancy and childbirth occur due to anaemia and under-nutrition. This points further towards the vicious cycle of poverty and ill health following each other in a socially oppressive system.

### *Poor institutional structures*

The institutional mechanism does not seem to be functioning well and needs major overhauling and improvement. Doctors and higher management officers have to be made more accountable for actual delivery performance.

## **2.2.2 Overcoming the challenges in healthcare**

### *Improvement in infrastructure and institutions*

Improvements are not possible if the quality of physical infrastructure is poor, but they are even more unlikely if institutions are weak. Studies reveal that the public infrastructure for both healthcare in India is of poor quality and inadequate to meet the full demand. Therefore, improvements can be brought about by expanding facilities and altering the delivery and institutional mechanisms to improve their quality.

### *Public expenditure on health*

The government should aim to increase public expenditure on health to 2–3 per cent of the GDP from the current 1 per cent as one of the strategies to meet the growing need. However, we also need to undertake institutional reforms to improve the effectiveness of service delivery.

### *Planning around the poorest*

The government must prioritise the needs of traditionally marginalised groups in planning its investments and outreach. The poorest districts of the country and the most vulnerable groups including women, children, people with disabilities, and communities like the dalits, adivasis, denotified tribes, and Muslim minorities must be the focus while planning for infrastructure and allocating resources. The introduction of user fees in public hospitals has further added to the burden of the costs borne by the poor in accessing public health facilities. Therefore, user fees should be eliminated for the very poor.

### *Uniform quality of service*

The quality of health is a crucial factor in ensuring the achievement of the human development outcomes intended through these services. The quality of health services even in the poorest areas of the country should be commensurate with the standards and norms envisaged by the National Development Goals at the very least, and encourage further improvisation and enhancement through active local participation, information sharing, and accountability.

## **3 PHYSICAL INFRASTRUCTURE IN INDIA**

For India to maintain the growth momentum, it is essential to strengthen infrastructure facilities such as transportation, energy, communication, and so on. However, performance of physical infrastructure in Indian economy in the last one and a half decades has been mixed and uneven. As well as being in short supply, India's infrastructure in most cases is also of poor quality by world standards. In fact, India's high rate of economic growth will be difficult to sustain if infrastructure development does not increase and keep pace with demand. Therefore, a number of measures are needed to address the various infrastructure constraints that the country faces and improve the productivity of infrastructure sector.

At this juncture, it should be useful to take stock of the current infrastructure situation in India and to compare with other countries, especially other major emerging economies like China, other BRICS countries and East Asia, with whom we are competing in exports and in attracting foreign investment. Thus, in this section, we benchmark India's infrastructure development (in transportation, electricity, information and communication technology) against other major countries of the world. We do this by comparing India's infrastructure development with that of China, which is perhaps the most relevant comparison, as its size is comparable to India's. We compare India's infrastructure development also with other country groups like East Asian countries (Malaysia, South Korea, Indonesia, Thailand and Philippines), other major emerging economies—BRCS (average over Brazil, Russia, China

and South Africa, i.e., BRICS countries other than India), and the average over the developed countries. We believe that such comparison will be helpful in understanding where we stand compared to the rest of the world and in setting reasonable goals for the future.

### ***3.1 The State of Physical Infrastructure in India***

#### ***Transportation***

In the transportation sector, comparison with other country groups reveals a somewhat mixed picture for India. India's performance regarding railways and road transportations look better than for air transportation and seaports. However, in this sector, it is rather difficult to compare across countries or country groups because of different geographies, climates and population densities. Thus, comparisons of, say, road or rail kilometres per unit area or per unit population have their limitations in providing an accurate comparison across countries. Nevertheless, for want of better measures, we use these measures since they still provide some indication of the real situation of transportation infrastructure (Table 6).

India is doing well in terms of road density by population (road-km/1,000 people). For the year 2010, road density for India was 3.3, which compares well with 3.0 for China and 2.8 for East Asia. However, India lags behind other BRICS countries, which were around 6.6 and way behind the developed countries which were at 12.1 in the year 2010. Given its relatively high population density and low forest cover, India also fares better in term of road density by land area (road-km per 1,000 sq km of land area) and stands at a better position compared to China, BRCS and East Asian countries, though behind the developed countries.

This indicator shows India has better road density than many relatively developed regions. However, the quality of Indian roads is relatively inferior. For example, only 50 per cent the total roads in India are paved—much lower than in East Asia (73 per cent) and in developed countries (84 per cent). When we compare India with China, we discover that though China was behind India in 2000, the percentage of paved roads has increased rapidly in China since then to 53.5 per cent of paved roads in 2011, thus leaving India behind.

Indian Railways is the world's fourth largest railway network in the world after the US, Russia, and China, comprising 115,000 km of track over a route of 65,000 km and 7,500 stations. As of 2011, the Indian Railways transported 0.8 million passenger-km per year per 1,000 people. This number is better than that for China, East Asia, and BRCS, but below that for developed countries. However, on volume of goods transported, India, at 0.5 million ton-km of goods per year per 1,000 people in 2011, fares better than East Asia only, and is considerably behind China (1.9), BRCS countries, (2.9) and developed countries (2.2).

**Table 6 India and the World: Comparison of Access to and Quality of Transportation**

Indicators	Year	India	China	East Asia <sup>1</sup>	BRCS <sup>1</sup>	Developed Countries <sup>1</sup>
<b>Roadways</b>						
Road density by population (road km per 1,000 people)	2010	3.3	3	2.8	6.6	12.1
	2000	3.1	2.6	2.4	6.7	13.3
Road density by land area (road km per 1,000 sq. km)	2010	1250	417	545.6	221.3	1390
	2000	1100	190	530	185	1790
Paved roads (per cent of total roads)	2010	49.5	53.5	72.2	38.8	89.5
	2000	47.5	40.8	63.2	37.7	88.9
<b>Railways</b>						
Railways, goods transported (million ton-km per year per 1,000 people)	2011	0.5	1.9	0.1	2.9	2.22
	2000	0.3	1.1	0.1	1.8	1.99
Railways, passengers carried (million passenger-km per year per 1,000 people)	2011	0.8	0.6	0.18	0.6	1.02
	2000	0.4	0.3	0.17	0.4	0.92
<b>Air Transport and Seaports</b>						
Air transport, freight (1,000 ton-km per 1,000 people)	2012	1.4	13.08	80.15	18.14	111.6
	2000	0.53	3.09	55.38	8.9	87.1
Air transport, passengers carried (per 1,000 people)	2012	57.7	200.9	489.8	332.6	1479.5
	2000	16.6	49	367.6	132.7	1196.2
Commercial perception of seaports (1 = poor, 7= world's best)	2009	3.47	4.27	4.3	3.6	5.3

Notes: 1. East Asia refers to average over Indonesia, Korea, Rep.; Malaysia, Philippines, Thailand

1. BRCS refers to average over Brazil, Russia, China and South Africa

2. Developed countries refer to average over the USA, the UK, France, Germany and Japan

Source: World Development Indicators, 2012

India's relatively decent performance in roads and railways by international comparisons is partly because other countries (such as in East Asia, BRCS, and, especially, developed countries) make much greater use of air transportation. This is evident from the data on air transport (Table 6). India trails all the countries in our dataset on both freight million ton-km per 1,000 people and passengers carried per 1,000 people per year. Thus, in India, only 57.7 persons per 1,000 people travelled by air in 2012 compared to 201 in China, 490 in East Asia, 333 in BRCS countries, and a whopping 1480 in the developed countries. In terms of air transportation of freight, India's volume was only 1.4 (1,000 ton-km per 1,000 people in 2012) compared to 13 for China, 18 for BRCS countries, 80 for East Asia and a huge 111 (or

about 100 times India's volume per 1,000 people) for the developed countries. Finally, India is also behind these countries in the volume of sea transportation as well as in the quality and efficiency of its seaports.

### ***Electricity***

Electricity is a very important form of energy used in homes, offices, and industry for enhancing production, efficiency, and productivity, and for personal comfort. We have data on three indicators: percentage of population with access to electricity network; electricity consumption per capita (kilowatt hours per year); and electricity power transmission and distribution (T&D) loss. While the first two indicators measure access to electricity and average consumption, the third indicator measures the efficiency of distribution in power transmission and the viability of electricity networks.

The data for India and other countries on these variables is provided in Table 7. In India, only 75 per cent of people have access to the electricity network. This compares to 86 per cent for the East Asian countries and 94 per cent for the BRCS countries, and almost 100 per cent for China and the developed countries. Comparison with China, with almost 100 per cent access, shows that India has a lot of work to do in this crucial area as lack of access to electricity seriously affects output and productivity. Next, if we look at electricity power consumption per capita, India again comes out at the bottom of the ladder with a per capita consumption of only 626 kilowatt hours. Compared to India's level, the per capita consumption of electricity is about 5 times higher in China, 6 times in East Asia, 7.5 times in BRCS and 15 times in the developed countries. This comparison again shows how far India has to catch up in this crucial aspect. Between 2000 and 2010, per capita consumption of electricity nearly tripled in China, but increased by only 63 per cent in India. This comparison shows that India can improve its performance much faster than it has.

Electric power transmission losses reflect the technical efficiency in transmission, while distribution losses largely represent theft of electricity in the form of unauthorised use and under-reporting of usage.

Such losses are usually larger in public distribution systems than in private ones, as the latter have a much stronger incentive to check such loss. India ranks at the bottom on T&D loss—it is 10.6 per cent for BRCS in 2010, 7.5 per cent for East Asian countries, about 6 per cent for China and developed countries, but 20.3 per cent in India—implying that more than one-fourth of the electricity output was wasted or stolen.

**Table 7 Quality of Electricity Networks in India and other Emerging and Developed Countries**

Indicators	Year	India	China	East Asia	BRCS	Developed Countries
Access to electricity network (per cent of population)	2010	75.0	99.7	85.9	93.6	99.9
	2000	-	-	-	-	-
Electric power consumption (kWh per year per capita)	2010	641.0	2943.0	3505.8	4101.9	8493.6
	2000	391.0	993.3	2456.0	3195.0	8326.4
Electric power T&D loss (% of output)	2010	20.3	6.1	7.5	10.6	5.53
	2000	27.63	6.9	8.44	11.08	6.02

Source: World Development Indicators, 2012

Thus, India's electricity infrastructure is seen to be one of the weakest. It fares badly not only in comparison to the developed countries, but also in comparison to other emerging countries, like China, East Asia and BRCS. China seems to hold important lessons for India in this regard: it has provided almost all its citizens access to electricity; its per capita electricity consumption is about five times India's; and its T&D loss is less than one-third of India's.

### ***Information and communication technology (ICT)***

Access to ICT is crucial for productivity enhancement not only now but also in the future, as the younger generation's exposure to ICT helps to prepare them for more productive jobs in the future. Access to ICT can be measured in terms of number of telephone and Internet subscribers per 1,000 persons, number of computers per 1,000 persons, and per capita expenditure on telephone, Internet, etc. The data on these indicators for India and other selected countries is shown in Table 8.

Data on total telephone subscribers reflects a somewhat lower access rate in India in comparison to other countries. India's situation regarding the number of landline telephone subscribers is dismal, with only 20 subscribers per 1,000 inhabitants in 2012. This compares with 210 subscribers per 1,000 inhabitants in 2012 in China, 214 in East Asia, 135 in BRCS, and 592 for developed countries. However, the situation is better in terms of cellular telephone indicators. The latest available data for comparison purposes is from 2012, which shows that per 1,000 inhabitants, there were 690 cellular phones in India, 810 in China, 1,186 in East Asian economies, 1,312 in BRCS, and 1,153 in developed countries. In 2012, the total number of telephone subscribers in India was 710 per 1,000 inhabitants. Although this figure is lower than in most other emerging and developed economies (Table 8), the difference is not very huge. In terms of total revenue of the telecommunication sector, it is

about 2 per cent for India as compared to about 3 per cent in China and developed countries and about 4 per cent in East Asia and BRCS countries.

**Table 8 Access to and Quality of ICT in India and Other Emerging and Developed Countries**

Indicators	Year	India	China	East Asia	BRCS	Developed
<b>Telephone access</b>						
Landline telephone subscribers (per 1000 inhabitants)	2012	20	210	214	135	591.6
	2000	29	114	182	155	542
Cellular telephone subscribers (per 1000 inhabitants)	2012	690	810	1186	1312	1153.3
	2000	6	68	188	103	546.8
Total telephone subscribers (per 1000 inhabitants)	2012	710	1020	1400	1448	1744.9
	2000	35	182	370	258	1098
Telecommunication revenue (per cent of GDP)	2008	2.01	2.87	3.96	4.37	3.11
	2000	1.52	3.21	3.07	3.44	2.88
<b>Computers and internet access</b>						
Personal computers (per 1,000 inhabitants)	2007	33	57	192	109	650
	2000	6	20	49	109	392
International Internet bandwidth (bits per person)	2008	32	483	1583	808	19337
	2000	1	2	16	9	240
ICT expenditure per capita (current US \$)	2008	46	195	594	403	2902.2
	2002	17.8	100.4	398.2	172.7	2075.8
ICT expenditure (per cent of GDP)	2008	4.5	6	7	6.2	6.2
	2002	3.2	7.9	6.8	6.4	6.3
Internet users (per 1,000 people)	2012	125	423	456	466	828
	2000	5	18	145	80	482

Source: World Development Indicators, 2012, Econstat, 2012

Data on access to computers and Internet show that India lies far below China, East Asia, and BRCS countries. The number of personal computers per 1,000 inhabitants in India was only 33, compared to 57 in China, 192 in East Asia, 109 in BRCS, and a whopping 650 in developed countries. India is also well behind in access to Internet services: Internet information accessed per person per year was a mere 32 bits, but about 15–50 times higher for other emerging economies, and a whopping 500 times higher for developed countries. Similarly, the number of Internet users per 1,000 people in India is at least four times less than in China, East Asia, and BRCS countries. For example, for 2012, the number for India was 125 per 1,000 persons, but 423 for China, 256 for East Asia, 466 for BRCS, and 828 for OECD countries. However, when we look at the rate of growth for India over the period of time, we find that India has done a commendable job in increasing the base from 5 per 1,000 at the beginning of the decade to 125 in just 12 years. Therefore, it is crucial for India to invest more

in this crucial sector and enable faster optical fibre Internet connectivity within the country and with other countries. This will not only increase the user base of the country but also increase the expenditure on Internet and contribute to enhancement of productivity and growth.

India's overall performance regarding ICT seems to be mixed—it is unfavourable in terms of the number of subscribers and technical efficiency, but has cheaper call rates, better telephony, and Internet quality perception than many comparable groups and economies.

### ***3.2 Challenges to Infrastructure Development***

There are multiple challenges to infrastructure development; funding constraints, land acquisition issues, delays related to identification and award of projects, and shortage of skilled manpower are some major reasons currently causing delays in infrastructure projects.

#### *Land acquisition*

Land acquisition has been the single largest roadblock for the development of infrastructure. Several projects have been stalled or delayed due to land acquisition issues. There are multiple reasons that lead to delays in land acquisition. One primary reason has been resistance from farmers or local communities whose land is being acquired. There was generally a huge difference between the price offered by the government agency forcibly acquiring the land under some archaic laws and the prevailing market value, which resulted in major disputes and litigation. In addition, the lack of well-planned, efficient, and demonstrable rehabilitation packages for displaced persons added to the distrust of local communities.

The Government of India has recently (in 2013) passed a new law, the Land Acquisition and Rehabilitation & Resettlement Act (LARR), to resolve disputes relating to land acquisition. This law will help farmers, who were being exploited earlier. However, this law now promises to pay farmers four times the existing market price for their land and requires the approval of 80 per cent of the landowners in the affected area, making it much more difficult for corporations to acquire land. This could be detrimental to private investment in the long term, since the viability of projects may be affected.

#### *Delay in regulatory and environmental clearance*

There are various categories of approvals required across the project cycle at every stage, right from the pre-tendering stage to post-construction. For instance, at the pre-tendering stage, there are substantial delays in inviting bids. Moreover, approval is required from multiple layers of the government at the central, state, and local levels. In most cases, there is

lack of coordination between the different agencies, leading to standoffs on critical approvals, which seriously affect the execution of projects.

Environmental safeguards and guidelines are evolving, which are similar to the scale and complexity of infrastructure projects. While new projects need to comply with these regulations, even a project under construction may sometimes need to comply with revised standards midway through the execution stage (or because some concerned government department or agency had 'overlooked' its duties and wrongfully issued required approvals). Clearly, better governance will be a big help in mitigating long delays in infrastructure projects.

#### *Funding constraints*

Funding is another major roadblock in the implementation of infrastructure projects. There is increasing reliance on the private sector for developing and maintaining infrastructure. The private sector, however, needs funds to develop infrastructure projects that are often capital-intensive and have a high gestation period. Typically, private investment in infrastructure projects is in the form of debt raised by developers. Most large developers have over-leveraged their balance sheets to raise debt; therefore, their cash flow does not permit raising fresh debt to fund new projects. Equity markets are not favourable for financing projects either, because of uncertainties involved in execution and returns. These uncertainties are due to various regulatory requirements that limit exit options, and to other vagaries of equity markets (such as various unpredictable global economy issues that can substantially impact the prices of any given share). These issues remain unresolved and continue to create problems in financing infrastructure projects.

#### *Capacity of private players*

Given the above-mentioned problems, another emerging challenge for the achievement of large infrastructure projects is the capacity of the private sector to undertake or implement such projects. Today, most large companies in India are integrated players executing projects as developers. However, the total number of such players is low and they have already secured several projects, which limits their capacity to undertake new ones, given the financing and other issues mentioned above.

Infrastructure projects in India are, however, becoming larger in size and complexity, and such projects require financial patronage and additional project management skills, which most medium-to-small Indian companies currently lack. Foreign players can bring in investments and technical expertise to undertake large and complex projects. There is, therefore, a need to speed up ongoing efforts to simplify the approval and the regulatory processes to attract foreign developers to invest.

### ***3.3 Overcoming the Challenges to Infrastructure Development***

#### *Land acquisition*

Earlier, the government had made cabinet approval mandatory for leasing, licensing, or transferring land. This led to long delays in concessions being awarded for infrastructure projects. Recently, by relaxing transfer regulations for land it owns, the government has taken a positive step. This should resolve the delay of projects by procedural issues, and complement the guidelines to resolve land issues. The government is expected to follow up with land acquisition policies or guidelines for project authorities and sponsoring agencies.

#### *Fast-track policy and regulation reforms for enhanced implementation*

Sponsoring agencies need to make a concerted effort to develop strong performance management systems to drive timely execution of projects. This includes defining performance standards for nodal agencies and creating a transparent and accurate tracking mechanism as well as performance-linked incentives and penalties. One of the methods of doing this is by having independent third party audits conducted for infrastructure projects. This will ensure greater transparency in public contracts and enhanced compliance on project execution. Moreover, additional expert opinions could help in improving project engineering. Third party audits should be a mainstream activity for planning and executing infrastructure projects.

#### *Dispute resolution*

At present, disputes between parties are one of the major causes of delay in projects. The arbitration clause is poorly defined or is one-sided. Furthermore, arbitration is generally not binding. Therefore, most cases go into further litigation. Given the extremely slow pace of Indian courts, this can be a long-drawn process. The government may also consider setting up a single quasi-judicial authority for all the infrastructure sectors. This authority would have statutory powers to resolve disputes between the authorities and private developers.

A large number of projects are delayed due to delayed regulatory approvals or clearances from different agencies. Government agencies often function independently, and there is no incentive or obligation to cooperate with project authorities to expedite the approval process. To eliminate this issue, a Performance Review Unit should be given powers to gather information from nodal agencies on clearances and incentivise or regulate this.

### *Facilitate funding for infrastructure projects*

The Twelfth Plan has aggressive investment targets, with at least 50 per cent of the investment proposed to be contributed by the private sector. Setting up of Infrastructure Debt Funds (IDFs) and reduction in 'withholding tax' on the interest paid on these bonds are some other positive measures that are expected to facilitate the flow of long-term debt into infrastructure projects.

Furthermore, decisions pertaining to inclusion of lending to infrastructure under the priority sector, exempting infrastructure lending from cash reserve requirement or at least the statutory liquidity requirement (which mandates that 24 per cent of all loans made by commercial scheduled banks in India be allocated to the purchase of government bonds) can facilitate infrastructure funding. Further, policy and regulatory reforms in the infrastructure sector as well as in financial markets can have a long-term effect on availability of funds since they create a conducive environment for investors. These need to be fast-tracked and will go long way in creating a mature financial market for facilitating investment in infrastructure.

### *Public private partnership (PPP)*

Allowing the private sector into some former fully government-owned infrastructure sectors, such as telecommunications and domestic civil aviation, has produced exemplary results. In both sectors, new private entrants now have market shares of over three quarters. Since the easing of regulatory constraints in 2004, the telecommunications network has become the third largest in the world. In both sectors, choice has expanded and prices have fallen. Even so, more needs to be done to promote competition in the fixed-line market, given the possibilities offered by broadband technology.

A significant start has been made in involving the private sector in the provision of transport infrastructure. By end 2010, the outstanding value of public-private partnerships (PPPs) had risen to an amount equivalent to 3.5 per cent of GDP, with most contracts having been awarded in the previous two years. The government encourages private involvement in the construction and operation of ports and airports. Here, there is a need to change the tariff-setting process in a way that encourages productivity improvements, moving away from a cost-plus basis system of price determination. The government has also introduced model PPP concessions, which are awarded on the basis of competitive bids for subsidies, or payments if the concession is estimated to be commercially viable. Early experience with private involvement in these areas is generally positive, but outcomes under contracts need careful monitoring. A significant implementation problem has been the need to obtain cabinet approval for road contracts that are sufficiently large to attract private sector interest. Greater authority should be delegated to the highways authority to speed up the process.

## 4 CONCLUSIONS

This paper has argued that good social and physical infrastructure facilities are crucial for rapid economic growth, rapid human development, poverty reduction, and improvement in living conditions for the people. A comparison with other emerging and developed economies shows that India's physical and social infrastructure is much poorer and requires major improvement.

Formal schooling per adult in India is appallingly poor, at only 4.4 years on average, while other emerging economies average at about 7 to 9 years. This is compounded by the poor quality of education—survey studies show that Indian elementary school students are typically about three years behind the standard in which they are studying. The condition of higher education is also quite bad. Vocational training, which could create productive jobs for so many with limited education, has simply not received the attention it deserves. A major expansion in education facilities at all levels, along with a significant improvement in the institutional structures to better deliver the promised education, is urgently needed. This has to begin with a system of regularly measuring the actual educational attainment at various levels and, then, careful monitoring and experimentation with institutional design to achieve far better performance.

In the health sector, the facilities for the vast majority of population are very poor and require urgent attention in both expansion and improvement in institutional mechanisms.

In the sphere of physical infrastructure, India's performance (for its level of per capita income) in the development of roads, railways, and telephony is reasonable though significantly behind China and other emerging economies. However, in the sphere of electricity access and consumption per capita, Internet access, level of air travel, and quality of seaports, India's performance is quite poor compared to other emerging economies. So, once again, major efforts need to be made to expand and improve the quality of the physical infrastructure and improve the institutional mechanism for faster delivery and less leakage. Land acquisition for infrastructure and industrial projects has been made too cumbersome by the new law of 2013; it needs to be revised. Regulatory and environmental clearances also delay infrastructure projects; these need better governance.

If proper effort is made in expanding education, health facilities, and physical infrastructure and improving their quality by increasing budgetary allocation and improving governance, it will go a long way in reducing poverty, improving human development, and reviving and sustaining high rates of economic growth in India.

## REFERENCES

- Annual Survey of Education Report (Rural) (ASER). 2012.
- De, P. and Ghosh, B. 2003. How Do Infrastructure Facilities Affect Regional Income?: An Investigation with South Asian Countries. Research and Information System for the Non-aligned and Other Developing Countries.
- Estache, A. 2006. 'Infrastructure: A Survey of Recent and Upcoming Issues'. In World Bank ABCDE Conference Tokyo, 29-30).
- Hall, R. E. and Jones, C. I. 1999. 'Why Do Some Countries Produce so much more Output per Worker than Others?' The Quarterly Journal of Economics 114(1), 83-116.
- Hanushek, E. A. and Woessmann, L. 2008. 'The Role of Cognitive Skills in Economic Development'. Journal of Economic Literature 607-68.
- Mankiw, N. G., Romer, D. and Weil, D. N. 1992. 'A Contribution to the Empirics of Economic Growth'. The Quarterly Journal of Economics 107(2), 407-37.
- Sahoo, P., and Dash, R. K. 2008. Economic Growth in South Asia: Role of Infrastructure, IEG Working Paper Series No. E/288/2008.
- Sahoo, P., and Dash, R. K. 2009. 'Infrastructure Development and Economic Growth in India'. Journal of the Asia Pacific Economy 14(4), 351-65.
- Tandon, A. and Cashin, C. 2010. 'Assessing Public Expenditure on Health from a Fiscal Space Perspective'.
- Wagstaff, A. 2002. 'Poverty and Health Sector Inequalities'. Bulletin of the World Health Organization 80(2), 97-105.

## RECENT WORKING PAPERS

---

<b>Title</b>	<b>Name of Author(s)</b>	<b>Paper No.</b>
Heat Waves Decrease Labour Supply: Evidence on low-income urban workers in weather-exposed occupations	Saudamini Das	E/338/2014
The Reserve Bank of India's Reaction to Exchange Rate Variation: A time-varying parametric approach	A Vadivel M Ramachandran	E/339/2014
Demand for Price Insurance among Farmers in India: A Choice Experiment-based Approach	Thiagu Ranganathan Sarthak Gaurav Ashish Singh	E/340/2014
Social Capital as Obstacle to Development: Brokering Land, Norms, and Trust in Rural India	Michael Levien	E/341/2014
Boom and Bust? A Political Economy Reading of India's Growth Experience, 1993-2013	Kunal Sen Sabyasachi Kar	E/342/2014
Anomaly in Decision Making Under Risk: Violation of Stochastic Dominance Among Farmers in Gujarat, India	Thiagu Ranganathan Sarthak Gaurav Ashish Singh	E/343/2014
China's Manufacturing Success: Lessons for India	Pravakar Sahoo Abhirup Bhunia	E/344/2014
The Role of Exports in India's Economic Growth	Pradeep Agrawal	E/345/2015
Financing for Health Coverage in India: Issues and Concerns	Indrani Gupta Samik Chowdhury	E/346/2015
Women Police in the City of Delhi: Gender Hierarchies, 'Transgression', and 'Pariah Femininities'	Santana Khanikar	E/347/2015
Bank Regulation, Supervision, and Performance around the World: What has been the Change since the Global Financial Crisis?	Vighneshwara Swamy	E/348/2015
Reducing Poverty in India: The Role of Economic Growth	Pradeep Agrawal	E/349/2015

---



सत्यमेव परमो धर्मः

**Institute of Economic Growth**  
**University Enclave, University of Delhi**  
**Delhi 110007, India**  
**Tel: 27667101/288/424; Fax : 27667410**  
**Website : [www.iegindia.org](http://www.iegindia.org)**