

Capacity Constraints On Progressing Of National Highway Projects In India

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INTRODUCTION

The pathetic condition of transportation sector in India vis-à-vis developed nations such as United States and European countries as narrated at Table 1 vindicates the genuine requirement of comprehensive reforms required in this arena. Road transport should be given an industry status so that transporters can avail of the benefits of being part of an industry. Construction of more transportation hubs and logistics SEZs should be initiated to create more common shared facilities for transportation. Lack of industry status makes it difficult for transporters to raise capital & debt through organized banking and financial channels. Uniform integrated tolling systems can be introduced, where vehicles need to only slow down rather than completely stop and wait in queues for collection of toll at toll gates.

Table 1 : Condition of Transportation Sector in India vis-a-vis Developed Nations

India	US & European Union (EU)
Trucks operate for just 20 days in a month @ an average speed of 20 km/hr i.e., 250 to 300 km/day.	Trucks operate at a whopping 25 days/month covering at almost 700 to 800 km/day.
Delays at check posts, traffic police booths, toll/octroi gates etc. It is estimated that unofficial payments amounts to about 15% of total trip expenses.	TIR Carnet System used in EU that requires no checking of consignments sealed at origin, at interstate check posts to facilitate smooth flow of high value perishable & time sensitive items.
Overworking of drivers leading to accidents and India tops in the accident deaths.	Better equipped roads and transportation system helps in speedy deliveries with lesser rates of accidents.

NATIONAL HIGHWAY DEVELOPMENT PROGRAM (NHDP)

The main roads in the Indian subcontinent have not kept pace with traffic volumes in terms of quality also. Out of the total 171,445 Km length of National Highways (NHs) & State Highways (SHs), only 2 percent of their length is four-lane, 34% are two-lane, and 64% are single lane. As far as NHs are concerned, only 5% of their length is four-lane, 80% have two-lane and the balance 15% continues to be single lane. Thus, the road sector, in spite of its high priority, is adversely affected by the poor quality and service levels. The poor quality of roads in India is highlighted by congestion, old fatigued bridges and culverts, railway crossings, low safety, no by-passes, slow traffic movement and above all, the impacts of vagaries of nature. The deficiencies in the road network are causing huge economic and environmental losses. In order to improve the road network on a country wide level, National Highway Development Program (NHDP) was undertaken in 1998 by way of widening & strengthening of existing highways, reconstruction /widening of bridges and constructing bypasses. The programme aims to develop the Golden Quadrilateral (GQ) and the North South as well as the East West corridor (NS-EW Corridor) as these are the high volume sectors carrying the substantial portion of the road traffic in India. Following incentives were announced to attract the investment and active participation of private sector through Public Private Partnerships (PPP) :

- ✿ Government will carry out all preparatory work including land acquisition and utility removal. Right of way (ROW) to be made available to concessionaires free from all encumbrances.
- ✿ NHAI / GOI to provide capital grant up to 40% of project cost to enhance viability on a case to case basis.
- ✿ 10 year corporate tax holiday & 30% relief for next 5 years. Concession period allowed up to 30 years.

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- ✿ Arbitration and Conciliation Act 1996 based on UNICITRAL provisions.
- ✿ In BOT projects, entrepreneurs are allowed to collect and retain tolls.
- ✿ Duty free import of specified modern high capacity equipment for highway construction.
- ✿ Capital grant of 40 per cent of project cost by NHAI.
- ✿ Private participation through BOT toll-based and annuity based structures.
- ✿ 100 per cent FDI allowed in roads sector.
- ✿ NHAI permitted to participate in equity in BOT projects up to 30 per cent.

A decade has passed after the announcement of this ambitious NHDP, but the project is lagging far behind the original completion schedules as depicted at Table 2. As per the World Bank Report on India's Road Construction Industry : Capacity Issues, Constraints & Recommendations (Oct 2009), Indian road construction sector is plagued by poor

Table 2 : Overall Status of NHDP (As On 31st October 2009)

Priority	NHDP Phase	Mile Stones			Construction Cost (Rs.Crore)		Mode of Funding	Length Completed & Under Implementation (km)
		Cabinet Approval	Original Completion	Extended/ Revised	Approved Cost [Expdr upto Oct 09]	Cost per km		
1	I (7,498 km) GQ - 5846 NS EW - 981 Port Rds - 356 Other NH - 315	Dec 00	Dec 03	Dec 06 Dec 09	30,000 (1999 Prices) [35,949]	4.04 (DL to 4L)	Toll, Annuity, CC	7240 & 252
2	II (6,647 km) NS EW - 6240 Other NH - 407	Dec 03	Dec 06	Dec 09 Dec 10	34,339 (2002 Prices) [33,303]	5.50 (DL to 4L)	Toll, Annuity, CC	3763 & 2228
3 5	III (12,109 km) III A - 4815 III B - 7294	Mar 05 Mar 06	Dec 09 Dec 12	Dec 12 Dec 12	80,626 (2004 Prices) [10,789]	6.65 (DL to 4L)	Toll, Annuity, EPC	1045 & 2605
7 10 13 14	IV (20,000 km) IV A - 5000 IV B - 5000 IV C - 5000 IV D - 5000	Cabinet Committee on Economic Affairs (CCEA) approved 5000 km in July 2008. Being implemented by MORT&H. Targeted Completion by Dec 2015.			27,800 (2006 Prices)	1.39 (SL to DL)	Toll, Annuity, EPC	
4	V (6500 km)	Nov 05	Dec 12	Dec 17	41,210 (2006 Prices) [1,718]	6.34 (4L to 6L)	Toll,	148 & 886
9 12	VI (1000 km) VI A - 400 VI B - 600	Dec 07 Dec 08	Dec 14 Dec 15	Dec 15 Dec 15	16,680 (2006 Prices) [NIL]	16.7 (expressway)	Toll	
Expressway stretch		Length (km)		Alignment Study		Feasibility Study		Construction to start by 2011 and completion expected by 2015.
Vadodara-Mumbai		400		Nov 08		Nov 09		
Delhi-Meerut		66		May 09		Nov 09		
Bangalore-Chennai		334		Jul 09		May 10		
Kolkata-Dhanbad		277		Jul 09		May 10		
6 8 11	VII (700 km) Ring-roads, Bypasses, Grade Separators, Service Roads etc VII A VII B VII C	Dec 06 Dec 07 Dec 08			16,680 (2006 Prices) [NIL]	23.8	Toll	Nil & 19

Legend : SL - Single Lane; DL - Double Lane; 4L - 4 Lane; 6L - 6 Lane; GQ - Golden Quadrilateral; NS - EW Corridor - North South & East West Corridor; Rds - Roads; NH - National Highway; Expdr - Expenditure

planning & execution, corruption, and huge time & cost overruns. When the outer limit of extension for contracts in UK is 25%, it is as high as 70% in India. About 40% of road contracts have cost overrun of 25 to 50%, and about 90 billion rupees is locked up in disputes and arbitration. Land Acquisition is another big challenge, with most tracts of land in India lacking clear title deeds and growing opposition from farmers against use of land for industrial purposes. Another major issue is funding, wherein India needs \$ 70 billion for building roads over next three years, and government is expecting atleast 50% from FDI, thus, there is heavy dependence on foreign investment. Commenting on the shortage of manpower, the report states that India has 1,10,000 highway engineers compared to more than 5 lakh in China during their peak highway program i.e., 1989-97.

CAPACITY CONSTRAINTS : GROUND SCENARIO

"There is an acute shortage of qualified and experienced manpower due to proliferation of major infrastructure projects. The contract stipulates minimum qualifications and experience for different posts in the contractors' site organization," says Col Vivek Bopiah (Retd), Executive Director (P), Bhagheeratha Engineering Ltd. *"Due to the sudden increase in the number of road projects, qualified persons are not available in the country. Most companies are poaching on others' turf. The fallout is that a large number of engineers are a floating population, who change jobs frequently, salary expectations have sky rocketed and the projects are suffering due to lack of continuity. It is also difficult to get all contractors to adopt self-disciplinary measures."* According to Mr. Mathew, a senior executive of another construction giant operating numerous projects of NHDP, contractors themselves should refrain from poaching qualified and experienced personnel from each other. *"The NHAI must reduce the experience criterion to widen the recruitment base,"* feels Bopiah. One to three years relevant experience (depending on the post) is more than adequate for any individual to be able to measure up, provided he has the total minimum experience, even if in other fields. When a new appointee is being inducted into a project, the NHAI should insist on the company producing a No Objection Certificate (NOC) from the previous employer of the individual before the approval process is set in motion. *"The construction industry should meet and evolve a strategy to curb this menace,"* is Patwardhan's take on the subject, who happens to be Managing Director of Madhucon Projects Ltd.

NATIONAL POLICY ON HUMAN RESOURCES

A country develops economically when the technical knowledge and skills of its manpower are put to optimum use in productive activities. The Government of India (GoI) has, therefore, decided to produce technical manpower in a planned manner according to the actual requirements of the country by providing opportunities for the development of technical education in a systematic way. With this objective in view, the Ministry of Human Resources Development formed National Technical Manpower Information System (NTMIS) in 1983 with 21 nodal centres in different states, which work under the guidance of the lead centre at Institute of Applied Manpower Research (IAMR) and funded by All India Council for Technical Education (AICTE). Out of 21 nodal centres, 17 nodal centres which are setup in different higher education institutes in different parts of the country, collect the information relating to the supply of technical manpower, student information through graduate follow-up survey and institutional information through institutional survey. The four regional centres at Board of Apprenticeship and Training (BOAT) collect information relating to the demand of technical manpower, through establishment survey. Every nodal centre produces an Annual Technical Manpower Review (ATMR) by consolidating the student, institutional and establishment data pertaining to the particular state. Each nodal centre collects information from engineering graduates and diploma holders after two years of their passing out, from engineering colleges and polytechnics as well as from the establishments employing technical manpower within its jurisdiction. The three fold data is processed to suggest a plan for the development of technical education in India to meet the manpower requirements of the country in the near future. NTMIS marks the climax of a series of options so far exercised by the government in planning of technical manpower in the country with the following objectives :

- ✿ Estimation of short-term & long-term requirements of technical manpower as well as the existing availability;
- ✿ Forecasting anticipated gaps in demand and supply;
- ✿ Matching job requirements with facilities for education and training;
- ✿ Assessing the adequacy of the current enrolment rate; and
- ✿ Undertaking studies on emerging and specialized areas & fields requiring urgent attention for expansion of

facilities for education and training.

As per the World Bank Report of 2009, the Indian Construction industry is likely to witness a shortage of skilled manpower by 55 to 64%. To meet this demand, the number of civil engineering graduates & diploma holders have to go up by at least a factor of 3. The report further says while the quantum of road works has gone up significantly in the last decade, the industry has not kept pace with this growth as evidenced by the under-utilisation of funds allocated to road projects and perennial time & cost over-runs on highway projects and this is mainly attributed to capacity constraints being faced by construction firms engaged in construction. Financial Express dated back to 20th October 2009 quoted that "*Despite good response to the bidding process for NHDP Phase III projects, there is a backlog of contracts to be awarded to successful bidders. Between May & Aug 2009, against a target of 28 contracts, only eight could be awarded and NHAI officials attributed this backlog to problems like non-preparation of DPRs and bid documents*". The Ministry came under severe criticism as it had failed to capitalize on the upsurge in highway investment as evident through negative grants in many contracts. The World Bank report suggested for initiating a system on rating, grading and registration of construction companies and individuals, as currently followed by US and several European countries, to improve professionalization in the industry, and to facilitate improved access.

ENTREPRENEURSHIP FOR ECONOMIC DEVELOPMENT

There can be no two opinions about the economic growth fostered by entrepreneurship, which has been proved beyond doubt in an extensive study in about 21 countries by **Reynolds & others (2000)**, underscoring the fact that successful entrepreneurial activity is strongly associated with economic growth. The classic case of Henry Ford, automobile industry tycoon of USA, shows that Ford's pursuit of his entrepreneurial activity led to significant increase in productivity implying efficiency, consequent distribution of higher wages to his workers and at the same time, produced vehicles at a much lower cost, thus passing on partly the benefits to the customers, thereby creating a win-win situation for all stakeholders. Buoyed by the success of Soviet model of state controlled economy, India's economic development strategy immediately after independence was based primarily on the *Mahalanobis Model*, which placed strong emphasis on mining and manufacturing (for the production of capital goods) and infrastructural development (including electricity generation and transportation). Thus, the strategy of economic development in India meant direct participation of the government in economic activities such as production and selling and regulation of private sector economic activities through a complex system of controls. In addition, the Indian economy was sheltered from foreign competition through use of both the "*infant industry argument*" and a binding foreign exchange constraint. Imports were limited to goods considered essential either for the development of the economy (such as raw materials and machines) or for the maintenance of minimal living standards (such as crude oil and food items). It was further decided that exports should play a limited role in economic development, thereby minimizing the need to compete in the global market place. As a result, India became a relatively closed economy, permitting only limited economic transactions with other countries. Over time, India created a large number of government institutions to meet the objective of growth with equity. The size of the government grew substantially, as it played an increasingly larger role in the economy. India's regulated economic policies of high taxation rates @ 93.5% in early 1970s and price ceilings along with the quantitative restrictions on production and consumption, led to an environment ripe for corruption. Due to government intervention, particularly, the high levels of government subsidies, it was clear by 1990 that India was living beyond its means. The result was a severe Balance of Payments (BOP) crisis in which, for the first time, the government physically transported gold overseas to prevent defaulting on foreign commitments. To meet its immediate balance of payments crisis, India also entered into a structural loan adjustment agreement with the International Monetary Fund (IMF). However, one condition of this loan required India to undertake economic reforms to move from a centrally-planned development strategy to one based on market-based resource allocations. As a result, the Government of India undertook a package of economic reforms between 1991 and 1993, with the intent of placing the market in place of government controls as the prime mover in the economic development process. Thus, the present era after a series of economic reforms ending bureaucratic red tapism, high progressive taxation & exim restrictions has set an ideal ground for blooming of individual initiative and in turn, has provided opportunities to spur economic development.

ENGINEERING EDUCATION & ENTREPRENEURSHIP

Engineering education makes an important contribution to the economic viability of any nation. **Bhaskaran (1996)** sees the technological dominance of USA has largely been possible because of its educational system, which has supplied an abundance of scientists and engineers besides business strategists, managers, skilled technicians and skilled workers. Engineering education in India is offered through three streams viz. craftsman, technician and engineering streams. Through the craftsman stream, the system produces skilled workers and the training period ranges from one to two years. For this purpose, industrial training institutes have been established in almost every district. The technician stream produces technicians middle-level workers needed for a wide range of professional duties for the application of knowledge in field operation, production, construction, testing and development, etc. These courses are offered at polytechnics situated in various locations around India. Through the engineering stream, the system generates engineers (Degree holders) for planning, managing, designing and conducting research in various areas of engineering and technology. Graduates of this stream are trained in engineering colleges, higher institutes of technology and universities. In spite of the fact that India produces substantial quantum of science and technical personnel, the country is facing problems of massive unemployment, low work efficiency and low productivity. This situation has been aggravated by the Indian education system itself, which moulds the student more for job/wage employment than self-employment.

Technical institutes concentrate on developing students' technical capabilities and very little emphasis is given to inculcating students for entrepreneurship as a career. This is the situation despite the fact that various schemes (eg science and technology entrepreneurship park, entrepreneurship development cell, industry institute interaction cell, community polytechnics) have been introduced at various technical institutions. The idea of these schemes was to stimulate those students who possess the latent entrepreneurial qualities to set up their own ventures. Due to the lack of proper support from educational administrators, these cells are on the verge of death or have not been able to achieve the expected results.

It has been observed that sustainable entrepreneurship could be developed with proper education and training provided to those persons with entrepreneurial zeal. This has been realized when **Khursheed (1999)** carried out experiment in two towns of Andhra Pradesh in collaboration with the Small Industry Extension Training Institute, where some young business persons were given an orientation course designed to stimulate the imagination, etc. The study revealed that the trainees displayed a more active behaviour, worked long hours, started new ventures, etc. It is a universal fact that the education and training of potential entrepreneurs has a significant bearing on the successful pursuits of entrepreneurship, yet the question arises what training inputs are needed for potential entrepreneurs. The entrepreneur has to discharge the twin functions of an entrepreneur and multifarious manager, so the need is to make them:

- ✿ Highly knowledgeable with vision and dynamism;
- ✿ Fully aware about the different schemes/incentives being offered and the procedures thereof;
- ✿ Understand the different laws, regulations and procedures to be followed in the establishment of a unit;
- ✿ Develop entrepreneurial vision, attitude and motivation and make them understand what behavioural competences are important for successful entrepreneurship;
- ✿ Understand the importance of financial discipline;
- ✿ Knowledgeable of the different stages of growth of an enterprise, how to face uncertainties and meet competition;
- ✿ Understand how to forge good relations with different individuals and organizations looking after industrial development;
- ✿ How to seize an opportunity, conduct market survey studies, and prepare project and feasibility reports;
- ✿ Fully capable of know-how, i.e., how to marshal and utilize their knowledge and resources in an effective way for the success of an industrial venture.

INDUSTRY - INSTITUTE INTERACTION

For a student pursuing education in medicine at any medical college, he is attached to a hospital as an intern. Throughout their study for five odd years, they have to undergo practical training at the hospital. Compulsory internship in their final years is a must prior to being awarded a degree. The teaching faculty at any medical college are

also practitioners in their respective specialization in the hospital, thus theory & practice go on side by side. In a nutshell, there is a close association between classroom & medical profession. There is a lot of talent at universities in India, but there is little connection between the universities and this massive highway development. In the United States, building the interstate system left a legacy in higher education. They had a tremendous growth in their research & training and education because of the interstate system. The universities were brought into the effort. India should have universities as partners because there is a great need for properly trained engineers not only now for construction, but also in the future to manage and upgrade the system. On the same lines, meaningful association is a must between industry & engineering education for raising the standard of output from the institutes and their utilisation in the developmental activities through employment. Few measures are listed below in this direction :

- ✿ Promotion of industry-institution interaction through apprenticeship opportunities, consultancy and sponsored research, continuing education programmes for industry personnel, 'adjunct professorship' in institutions for willing and capable personnel from industry, 'residency' for institutional faculty in industry, involvement of industry in the development for curricula, courses etc.
- ✿ Setting up of industrial liaison boards, industry-institution cells, industrial foundations etc.
- ✿ Establishment of national laboratories such as BARC, NAL, NCL, NPL & DMRL, and training of students at the post-graduate and Ph.D. levels in chosen areas of advanced technology.
- ✿ Encouraging mobility and exchange of faculty between academic institutions, national laboratories and industrial establishments.
- ✿ Strengthening of the scheme of networking higher technological institutions with less developed ones.
- ✿ Involvement of professional bodies as Institution of Engineers, UGC, AICTE, IGNOU etc in planning and organizing educational programmes.
- ✿ Technology watch and assessment of manpower needs.
- ✿ Ensuring of coordination between the Technology Information Forecasting and Assessment Council (TIFAC) under the Department of Science & Technology and the National Technical Manpower Information System (NTMIS) under the Department of Education to couple the technology forecasting system with the system for manpower forecasting and planning.
- ✿ Preparation of National Directory of Occupations and Job Titles to identify a variety of need-based courses and fixing intake levels.
- ✿ Making the Scientists Pool in the CSIR more attractive by offering better remuneration according to merit and placement in the right institutions.
- ✿ Utilisation of all international collaboration programmes to enable Indian scientists and technologists to undertake useful collaborative projects with well established institutions abroad.
- ✿ Check migration of engineering graduates to non-engineering professions through career guidance activities.
- ✿ Make available opportunities of employment, including on part-time basis, for well trained women scientists/engineers.
- ✿ Consider bringing in legislation to ensure that highly trained engineers and technologists put in atleast three years of service in the country before they can go abroad as in countries like France.
- ✿ Promotion of research and development (R&D).
- ✿ Set up some of the major national facilities required for carrying out research in educational institutions.
- ✿ Provide access to the major national facilities to wider cross-sections of academic community and more importantly, to the student community on the campuses.
- ✿ Assign to educational institutions, challenging mission- oriented projects to give better focus to their R & D efforts.
- ✿ Promote centres of excellence around small groups of scientists and engineers.
- ✿ Allocate resources for research on the basis of priorities rather than something-for-everybody basis.
- ✿ Identify problem-oriented research projects of national importance in consultation with industry and national agencies.
- ✿ Setting up of a National Board for Science and Engineering Research solely for funding fundamental research on the pattern of the National Science Foundation (NSF) of the United States.

✿ Encourage multi-disciplinary, trans-disciplinary and trans-organizational research with emphasis on design and development.

ENTREPRENEURSHIP DEVELOPMENT

Synergy among talent, technology, capital and know-how is essential for the success of a venture. If one of these essential factors is missing, then the probability of failure increases. Given India's economic progress in recent years, the country is now ready for the implementation of microeconomic policies that will foster entrepreneurial activities. Fortunately, in addition to the macroeconomic reforms mentioned earlier, India has taken other steps to lay the foundation for the type of economic growth that can be fostered only by entrepreneurial activities and appropriate economic policies that reflect individual rights and responsibilities. "Global Entrepreneurship Monitor" (GEM), a joint research initiative conducted by Babson College and London Business School and supported by the Kauffman Center for Entrepreneurial Leadership identified the Entrepreneurial Framework Conditions as under :

✿ **Availability of Financing** : The Government must ensure that its new entrepreneurs will have access to venture capital through Loans from Banks & other Financial Institutions (FIs). The Government can also promote the establishment of a global support network of venture capitalists and other funding sources (also known as "angels") who would be willing to support the new entrepreneurs.

✿ **Supportive Government Policies** : Government must create "areas of excellence" breeding grounds where ideas grow into new businesses similar to those created in the Silicon Valley in the United States. They can attract the ideas, the venture capital, and the management talent often found to succeed in other entrepreneurial efforts around the world. The country can begin to create these areas of excellence by drawing upon the resources of its universities and other educational institutions, including the Indian Institutes of Technology (IITs). Government policies on taxing and regulation of business also can promote entrepreneurial efforts. Further, the government must ensure that new entrepreneurs have access to both the functional and entrepreneurial skills needed for success in business startups. The functional skills include abilities in such areas as marketing, finance and product development. The entrepreneurial skills include managing risk, building an effective team and raising funds.

✿ **Education and Training** : The Indian School of Business (ISB) at Hyderabad has already produced a curriculum suited to the development of entrepreneurial leaders. It will soon have a new Entrepreneurship Centre that will be founded, led and managed by several leading Silicon Valley entrepreneurs. India needs to foster networking and exchange among both new and established entrepreneurs. The obvious reason is that entrepreneurs can learn not only through their own experience, but also through that of others. An effective approach to encouraging this type of networking might be to follow the academic model and begin to schedule conferences throughout India at which these individuals could interact. At these conferences, experienced entrepreneurs could present their ideas on what has worked for them (and what has not). Entrepreneurs just getting started could describe what they hope to achieve in their new businesses and get feedback on their plans from other entrepreneurs present. Obviously, newer entrepreneurs will want to be careful not to divulge important company secrets. The Indian government might have to provide small grants to subsidize the travel and lodging expenses of individuals lacking the resources to attend such conferences. However, just as in the academic setting, those grants could be awarded based on the merits of an individual's ideas for a startup business.

✿ **Cultural & Social Norms** : It is also found that the perceived social legitimacy of entrepreneurship can be a critical factor in its success. Specifically, it has been experienced that respect for individuals starting new firms was an important cultural factor for countries with high levels of entrepreneurial activities. In short, uncertainty within the culture can lead to resistance. As far as India is concerned, entrepreneurs of recent origin such as Narayana Murthy of Infosys, Azim Premji of Wipro, Steel tycoon Laxmi Mittal, Ambani brothers figuring in the Top Ten Rich of the World & so on are shown great respect and many are inspired by their path of prosperity.

✿ **R & D Transfer** : State Industrial Corporations have been established throughout the country and are operating at every District level, which acts as a conduit in transferring the requisite technology and also assists entrepreneurs in processing their ventures from feasibility stage itself. Unfortunately, they are not well equipped due to Government's negligence with meager budgetary support. The existing set up should be reactivated so as to promote the enterprise zeal. Further, it would be beneficial for the established Private Industrial Houses as Tatas, Reliance etc. to extend

consultancy services for budding entrepreneurs, especially their ancillary industries in the initial stages.

✿ **Commercial & Legal Infrastructure** : Industrial Associations such as FICCI should take the responsibility by providing commercial & legal services to the new entrants so as to remove initial teething problems.

✿ **Internal Market Openness** : Unlike export oriented economies such as Japan, India has a vast domestic consumption, which is in fact the sole reason for the interest shown by foreign investors. This domestic market should be adequately projected by Government to various investors so as to encourage entrepreneurs. However, more than just opportunities should lead India to consider entrepreneurial activities as a way to economic growth. At least one major threat, a growing population, also should motivate it to consider entrepreneurial effort as an economic policy. Specifically, the country's population is expected to increase by 110 to 130 million people over the next 10 years, with approximately 80 to 100 million of those new citizens seeking jobs that do not currently exist. Entrepreneurial efforts can help to provide those jobs.

✿ **Access to Physical Infrastructure** : India has made several important structural changes, including the construction of telecommunications networks and the commencement of a nationwide road-construction programme. Entrepreneurship or Executive Development Programmes (EDPs) in engineering institutions can be helpful, not only in solving the problem of unemployment, but also for the sustainable development of Small & Medium Enterprises in India. For the sustainable growth of the small-scale sector in India, it is imperative to make it competitive. To develop capable entrepreneurs, entrepreneurship development programme should be planned in phases, i.e. identifying the right persons, developing entrepreneurial vision, concept and capabilities (i.e. know-how development); guiding and supporting entrepreneurs during the pre and post-training stages to enable them to stand on their own feet and face uncertainties more confidently. Entrepreneurship should be accepted as a discipline and needs to be learned and practiced. Preparing for a job cannot be the sole objective of education. It is important to motivate young talents in science and technology to become entrepreneurs as a viable pursuit of excellence. Integrating entrepreneurship education at technical institutions should not only stimulate innovation, but also enhance the level of creativity and value consciousness in entrepreneurial ventures. In today's society, it is technology that drives the economy, since engineers create this stuff; they are the real masters of society. Engineers as entrepreneurs should be inculcated on the hard fact that technology to be adopted in new ventures should be omnipotent, omnipresent and omni euphoric for its sustainability.

INDIA vs CHINA

Quite often, parallels are drawn between the two great gigantic neighbours and this comparison seems to be most appropriate, given the commonality on many fronts. Both China and India had similar GDP growth about 25 years ago. However, China's economy is now much ahead of India's. China's growth has been fuelled by manufacturing and strong foreign direct investment. Its infrastructure sector has also played a significant part in the country's economic growth. India, on the other hand, relies on domestic consumption, services and technology & software sectors. China has a massive land mass and a population of 1.3 billion, which provides a strong labor force and a large consumer base. India also has these characteristics. One key difference is the relatively more centralized and authoritative Chinese government, which enables it to make decisions and utilize resources with little opposition while India's democratic structure results in slower decision-making and implementation.

Another key ingredient for China is Taiwan. The Chinese in Taiwan were extremely successful in developing an export powerhouse, absorbing high technology and efficient production techniques and using government incentives to encourage investment in targeted areas. They also cleverly developed export markets first in the U.S. and then in Europe and other parts of the world. They transferred a lot of that knowledge to China through their investments and establishment of factories on the mainland. The combination of Taiwanese know-how and a centralized power base has allowed China to stimulate strong investment inflows to improve the country's infrastructure and develop manufacturing facilities, which in turn has strengthened exports. This coupled with China's vast, mobile and low-cost labor force has made the country one of the most inexpensive and diversified manufacturers globally, producing products from mobile phones to motor vehicles. High national savings in excess of 40% of GDP has further supported investment in the country. Core problems in China include rising food prices and subsequently, inflation. China's

export & investment oriented growth has also led to overcapacity in many sectors.

A widening of the gap between the rich and poor is also a major issue in China as well as in India. Rural poverty and unemployment, political corruption and environmental concerns are also issues that need to be addressed in China. Core problems facing India include the lack of infrastructure development and high fiscal deficit, which have been hindering the country's development. To ensure that India's growth is further augmented, the government needs to focus on reducing the high fiscal deficit. Policy opacity and flip flops, as well as the slow and cumbersome law and order system have also been hindering the nation's growth. Social factors such as over population, poverty in some parts of the country and child malnutrition are also issues facing India today. High energy and food prices as well as rising inflationary pressures are also factors which have begun to impact the standard of living.

China is one of the fastest growing economies in the world. Expectations for the high growth rates to continue for the foreseeable future could see China become the world's second largest economy, after the US, in the next 10-15 years, and perhaps, even surpass the US in 35-40 years. As one of the world's fastest growing economies with a consumer base of 1.3 billion people, consumerism thus has been flourishing in China. Foreign direct investment continues to grow as international investors remain attracted to China's booming economy. Its foreign exchange reserves are also the largest in the world, making it less vulnerable to external financial shocks.

China enjoys wide manpower resources from the many central and provincial State Owned Enterprises (SOEs). It was only up to the mid/late 90s that the capacity was considered to be insufficient to meet the demands of the expressway program. The Chinese highway industry rapidly learned from their international joint venture partners and the Ministry of Communications (MOC) reports that it is now unusual to require the assistance of the international highway building community on expressways. The process by which large SOEs win expressway bids in the provinces and then hire smaller SOEs and private subcontractors to complete specific sections or supply particular trades on the project has rapidly developed the supply chain for manpower in the industry. There are also technical colleges and professional schools, where some higher caliber labor can be trained. Skilled operators for plant and equipment have been trained initially by the international machine manufacturing companies who, when selling plant and equipment to Chinese companies, arranged either to train operators in their own country, and/or to send trainers to China with their equipment to work alongside the trainee operators. There has never been a shortage of high caliber civil engineers in China. The profession is highly regarded in the community and salaries are higher than the average for other professions and even the IT industry. There is great competition for students entering civil engineering streams in certain universities, and particularly, in certain institutions. Putting enough manpower and attention into completing land acquisition and pre-construction before starting work is also amply rewarded by subsequent rapid construction. In Hubei, although land acquisition and resettlement are easier than in India, large teams are mobilized within the implementing agency to work speedily on these issues with success.

In India, the government has been implementing structural, economic and financial reforms since early '90s. Corporate governance has also been improving, with many companies striving to meet international financial standards. Government efforts to tackle corruption have also been evident. India's economy is also expected to continue to record sustained economic growth in the future. The country is also a good example of where entrepreneurship has taken hold of the economy, and the private sector is thriving despite the government bureaucracy and poor infrastructure. The market in India also benefits from a strong tradition of saving and India, compared to China, has a lower dependence on exports to the U.S. as a percentage of its gross domestic product, which may help it to partially insulate it from a U.S. economic slowdown. Moreover, the quality of higher-level education in India is comparable to top international universities, and is much better than counterparts in China. This has enabled the country to produce highly intelligent workers in fields ranging from business management to science to information technology.

This has also led the country to become one of the most revered locations for outsourcing by developed markets. English, the most commonly used language in the world, is used much more extensively in the ex-British colony, making it easier for Indians to merge into the global arena. Franklin Templeton Investments & Asset Managements Ltd., a leading global financial consultancy firm strongly recommends for investments in the energy, materials, consumer and infrastructure sectors in India. Consumerism remains a major investment theme with higher population incomes resulting in greater demand for products and services. Energy stocks should continue to benefit from greater revenues and earnings as a result of high oil prices and greater global energy demand. Growing demand for raw

materials in both markets as well as high commodity prices should support corporate earnings in these companies. India continues to invest heavily in infrastructure development, which should benefit companies in this sector. This encouraging story of 'India Shining' should be projected in the domestic market as well as abroad for attracting the entrepreneurial talent in the highway sector.

ENTREPRENEURIAL SUBCONTRACTORS FOR NHDP

Road construction activity, though looks simpler as compared to other civil construction works as dams, multi-storeyed structures etc, in practice, it is not so. Various associated activities which are in fact tedious & time consuming make the highway construction a specialized task. The paucity of adequate construction firms/contractors for taking up this mega highway program with time bound schedules under NHDP can be addressed to a certain extent by generating suitable sub-contractors by encouraging the technically qualified youngsters as well as experienced & volunteering personnel. Certain incentives in the form of loans, machinery & trained technicians can be made available to them through Industry Promotion Councils etc. There are innumerable sectors associated with highway construction as listed below :

- ✿ Feasibility Studies, Alignment surveys, Preparation of Detailed Project Reports (DPRs) etc;
- ✿ Design Consultancy for Pavements, Bridges & other structures;
- ✿ Earth work in hill cutting, embankment, leveling & grading etc involving excavators, loaders, dumpers, rollers, motor graders etc;
- ✿ Construction of earth retaining & cross drainage structures, open & covered drains, kerbs & dividers etc;
- ✿ Hydraulic survey & various investigations for major & minor bridges;
- ✿ Construction of Bridges, which itself is a vast specialization e.g., Foundation - open, well & piling; substructure piers & abutments; fabrication & erection of staging & false work; superstructure, bearing manufacture & installation, expansion joints, load testing, Supply & conveyance of Ready Mixed Concrete (RMC), Geo-synthetic reinforced earth fill for bridge approaches etc;
- ✿ Quarrying & Crushing of stone aggregates in various sizes;
- ✿ Laying & Compaction of paving courses as GSB, WBM, WMM and bituminous courses necessitating the requirement of Sensor Pavers, vibratory & smooth wheeled rollers, tar boilers & sprayers etc;
- ✿ Manufacture & Conveyance of bituminous Ready Mix Material (RMM) from Hot Mix Plant (HMP) of medium to heavy capacity;
- ✿ Laying of cement concrete pavement with Slip Form Pavers;
- ✿ Manufacture & Supply of Hume Pipes for culverts;
- ✿ Manufacture & supply of Road sign posts, informatory boards & arch/gantries, crash barriers etc;
- ✿ Road marking with paint by hot patch machines, cat eyes for night vision etc;
- ✿ Mastic Asphalt covering for bridge deckings; and
- ✿ Road Maintenance Contracts.

The advantage of subcontractors lie in their specialization, who come as handy for EPC contractors in their works (complementary role). Also, it is very easy to start with as a specialist subcontractor due to limited capital involvement. Further, these subcontractors, on gaining confidence in the due course of time, can aim for big even in the capacity of BOT firms (supplementary role). Moreover, this arrangement has an inbuilt advantage of utilizing the existing human resources to the fullest potential in the nation building activities. The following agencies should take on the responsibility distributed as under :

✿ **National Highway Authority of India (NHAI)** : NHAI, the nodal agency under the Ministry of Road Transport & Highways, which is monitoring the NHDP should undertake the publicity work of various ongoing highway projects through seminars & lectures projecting the investment as well as job opportunities in this sector. Further, it should make the literature on investment opportunities in highway sector available at DICs for information of the interested entrepreneurs. On the same lines, NHAI should closely interact with HR policy formulation agencies such as IAMR, NTMIS, TIFAC etc in projecting the actual requirement of requisite tradesmen & specialists for unhindered implementation of highway programme under NHDP, since the reasons ascertained for slack performance of many contracting firms is attributed to paucity of skilled & trained personnel. NHAI being at the helm of highway construction can take the initiative for channelizing the technical & managerial skills of retired personnel from

highway sector so as to make them available for the needy construction & consultancy firms. Wielding its influence in the highest echelons of Government due to frequent interactions at inter-ministerial Committee on Infrastructure (CoI), Chief Secretaries meetings etc, NHAI can pass on the directive through PMO to all engineering organizations such as PWDs, BRO, MES etc for sparing the willing professionals volunteering to proceed for NHDP works on long leave/deputations. These Organisations can easily manage their work with 20 to 30 % deficiencies for a period of 3 to 4 years.

✿ **District Industries Centres (DICs)** : DICs under State Directorate of Industries presently serve as Micro, Small & Medium Enterprises (MSME) Development Institutes at every district level, extending basic services as market survey & forecasting of demand, feasibility studies, project reports, land, electricity, water, licenses, clearances, Loan Melas etc for prospective entrepreneurs.

✿ **National Academy of Construction (NAC)** : Such institutions should be at state capitals to involve deeply in the training (both initial as well as on the job training) of various technicians & tradesmen, serving as employment exchanges helping technicians as well as entrepreneurs being prospective employers.

✿ **National Institute for Training of Highway Engineers (NITHE)** : The National Institute for Training of Highway Engineers, set up by the Government of India would need to play a vital role in training effort and may consider entering into MOUs with the international and national training/academic and research institutions to provide the institutional support. NITHE should also come out with a comprehensive booklet indicating the various areas of training for different levels of highway engineers, duration and course contents. NITHE should also function as a repository of documentation of all major projects for future lessons. Simultaneously, all the departments dealing with roads both in the Central and State Government should support the NITHE by sending adequate number of persons for training and also in financial terms by paying annual contribution. This will help in augmenting the activities of NITHE. Its charter should be further reactivated vigorously to extend its services to interested entrepreneurs, consultants and construction firms.

✿ **National Highways Builders Federation (NHBF)** : NHBF is an apex organization of all contractors/builders of national highways, state highways and bridges in the organized sector all over the country. Its affairs are managed by the managing committee and constituents actively working for the welfare of road builders as whole with the following aims & objectives :

- ✿ To promote the interest, and to generally help persons engaged in the business of road building by means of improving their services.
- ✿ To acquire and disseminate knowledge about working of road builders in other countries and to induce the members to raise the standard of service, to import up to date, scientific knowledge about new machinery and valuable results on scientific results carried out in other countries, about use of new designs, materials etc.
- ✿ To discuss, support, oppose any legislation or executive matters by legitimate and constituent means, which may affect or is likely to affect the road building industry.
- ✿ Safe guards and defends lawful legitimate rights and privilege of the members engaged in road building.
- ✿ Take up consideration, discuss and push forward the views, points of highway building in question, generally affecting industry by organizing, promote, attending conferences/ lectures or other useful functions.
- ✿ Carry on propaganda in press by contributing articles or advertising in print/electronic media and to publish official organs for this purpose.
- ✿ To represent officially, on highway construction to government, other localities, authorities, chambers of commerce, nominate/ represent to serve the committee appointed by the government/ legislative body or some other agencies.
- ✿ To organize training programmes/workshops for imparting knowledge, senior, middle and skilled/unskilled workers with the help of government/non-government agencies.

CONCLUSION

India's biggest resource is its skilled manpower. With over 380 universities and 1,500 research institutes, India

produces 2.2 million university graduates, 300,000 post-graduates and 9,000 PhDs every year, providing a large base of skilled manpower. Today, roughly 220 of the world's leading companies on the Fortune 500 list use the IT services provided by Indian firms, while about 100 of the Fortune 500 companies have established research and development units in India. Many American companies initially outsourced to India because of cost advantages, but today, they do so to take advantage of the country's high-quality human resources & technological competitiveness. Behind the strength of India's IT industry is the competitive nature of its engineering education. Each year, roughly 200,000 applicants vie for 4,000 openings at Indian Institutes of Technology. In contrast to the Chinese development model, India's growth has been mainly driven by its huge domestic market. Domestic consumption accounts for 66 percent of India's gross domestic product - compared with 55 percent in the European Union and 44 percent in China. India today has a middle class of roughly 300 million people, and about 1 percent of its population is getting out of poverty each year. The country's potential as a market derives from its young population -- with 54 percent of the total population below 25 years old as of 2001. This demographic pattern is promising both in terms of workforce and consumption, unlike in China, where the working population is expected to stagnate in the coming decade or so and could create social security problems.

India with its huge pool of scientific manpower can think of opening up its vistas to other developed countries such as Japan. While Japan in the future could face shortages of IT human resources due to the declining birthrate, retirement of corporate engineers and other factors, India continues to produce competent engineers. While only about 20,000 people enter the IT industry each year in Japan, 120,000 do so in India. The relatively labor-scarce but capital-abundant Japan and capital-scarce but labor-abundant India can complement each other. Similarly, India's software prowess and service skills complement Japan's track record as one of the world's greatest hardware producers. Report of the MOSRT&H Working Group on Roads (2007-2012) for 11th Five Year Plan (Apr 2007) has come out with praiseworthy suggestions as compiled at Table 3, but the same needs to be implemented by all responsible agencies. Further, the Working Group has placed an ominous role for Public Works Departments (PWDs) of the States / Union Territories as reproduced below :

'The State PWDs are responsible for policy, planning, design, construction and maintenance of the State Highways and Major District Roads. They also execute works on National Highways on agency basis. Basically, these organizations are performing an extremely vital role in provision of road infrastructure on the ground. However, they need to be reoriented to the needs of current emphasis on private sector participation and implementation of large scale projects, for which assistance from the multilateral funding agencies like the World Bank, the Asian Development Bank and the Japanese Bank for International Cooperation is being sought. Presently 43,705 km of National Highways are with the State PWDs. Though NHAI is being entrusted in phases with the National Highways included in various phases of NHDP and other important projects, substantial lengths of National Highways will continue to remain with the State PWDs. The PWDs are basically a strong institution and need to be preserved. Account Codes and Works Manuals in the State PWDs are well developed. However, they need review in the light of procedural changes made at the Central level to keep up with the latest technology. There should be proper synchronisation of the workings of the procedures and systems at the Central and State levels. Many State PWDs have established a separate organization for implementation of the works on National Highways. This needs to be done by all the State Governments. The State Governments should develop these National Highway departments by posting the officers having experience only in roads and bridge works. The present emphasis on private sector participation for development and maintenance of National Highways systems and procedures in the State PWDs are also to be amended. There is considerable stagnation at the State level of the technical officers with adequate qualification and experiences. The State Government may adopt a policy of allowing the engineers of the Public Works Department to take up jobs with the contracting and consulting organizations both in private and public sectors for a fixed tenure and retain lien with the parent Department. This would help to the Government departments, individual engineers as well as the contractor / consultancy organizations. Some State Governments like Rajasthan and Andhra Pradesh are following this practice. There is urgent need for the other State Government departments to adopt this policy. The Central Government may amend their policy in this regard'.

Table 3 : Recommendations of MORT&H Working Group on Roads for XI Five Year Plan

S/No	Recommendation of Working Group on Roads for 11th Five Year Plan (2007-2012)	Responsibility for the Implementation
1.	Training of engineering personnel for keeping abreast with latest knowhow & good practices within the country & outside [Para 3.7]	State PWDs, BRO
2.	Earmarking of ₹ 100 crores for R&D activities in NH sector [Para 4.3]	MORT&H
3.	Annual provision of about ₹ 5 crores by each State/UTs for SHs MDR for road improvement measures & traffic safety [Para 4.3]	State PWDs
4.	Creation of national level PPP unit for information dissemination and guidance so as to provide advisory to APP programme [Para 5.4 (a)]	NHAI for NHs; and State Govts for SHs & urban roads.
5.	Preparation of blue print for creation of industrial establishment along important NH/SHs earmarked for widening and appropriate measures for acquiring additional land prior clearance from MOEF and shifting/removal of utilities [Para 5.7.3]	State Govt & NHAI
6.	Standing committee with representatives of all stakeholders (on the model adopted by Maharashtra PWD) to inspect the roads & suggest road improvement measures to eliminate black spots on the road and to make roads more safe for the travelling public [Para 5.7.3]	All state Govts
7.	Enactment of Control of NHs (Land & Traffic) Act 2002 intended to enhance road safety, access management, control on ribbon development and prevention of encroachment on NHs [Para 4.2.2]	All State Govts.
8.	Setting up of computer based road accident database management system as a part of Road Data Centre so as to initiate counter measures for making accident free corridor [Para 4.2.3 (ii)]	State Govt.
9.	Replacing the existing system of Gang Labour for maintenance activities with proper scientific system such as Pavement Management System (PMS), Mobile Bridge Inspection units, O&M contracts etc adopted by NHAI [Para 6.1.6]	State PWDs, CPWD, BRO & all road maintenance agencies.
10.	Creation of Special Cells to co-ordinate all activities related to environmental impacts of highway projects [Para 7.4 (i)]	MORT&H, NHAI/ PWDs, of State/UTs.
11.	Introduction of internal Quality Audit and Quality Assurance of Consultants work and institution of gradation system for consulting firms in terms of size of project and keeping track of their performance. [Para 9.3 (v)]	NHAI/MORT&H to rope in ISO certification agencies and independent professional agency like ICRA for evolving a suitable methodology.
12.	Encouragement for creation of Equipment Banks for leasing or hiring of equipment to support the contracting industry [Para 9.4 (v)]	MORT&H /NHAI/State PWDs
13.	Formulating a comprehensive scheme for training of personnel from the centre & states with a fair share of slots for training for the individual states. [Para 8.5.4]	MORT&H
14.	Adoption of a policy of allowing the engineers of PWDs to take up jobs with the contracting & consulting organisations both in private & public sectors for a fixed tenure & retain lien with the parent department, this helping Govt depts, individual engineers as well as contracting/consultancy organisations. [Para 8.4]	MORT&H should take up case with State Govts & Central Govt for Implementation of this suggestion in order to address the serious problem of huge deficiency of engineers on NHDP works.
15.	National Institute for Training of Highway Engineers (NITHE) to enter into MOUs with international and national training academic research institutions to provide institutional support. Further NITHE to come out with a comprehensive booklet indicating various areas of training different levels of highway engineers, duration and course contents. NITHE should also function as a repository of documentation of all major projects for future lessons. [Para 8.5.3]	NITHE
16.	Simultaneously, all the departments dealing with roads both in Central & State Govt should support the NITHE by sending adequate no. of persons for training and also in financial terms by paying annual contribution [Para 8.5.3]	MORT&H, NHAI, State PWDs, CPWD, BRO etc

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