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Issues and Challenges in Make in India: With Special Reference to Roads & Transport

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Abstract

Make in India is business friendly program launched by Prime Minister Narender Modi on 25th September 2014 to encourage multinational and domestic companies to manufacture their products in India. It is launched with an aim to turn the country into a global manufacturing hub. The initiative aims to raise the contribution of manufacturing sector to 25% of the GDP by the year 2025 from its current 16%. There are many issues that need to be addressed in different infrastructure field like electricity, production, transport etc. As roads and transportation is the backbone of Indian infrastructure but it is inadequate in terms of quality, quantity and connectivity. Also in the overall transport sector, civil aviation and ports desperately need modernization. It is expected that public sector will continue to play an important role in building transport infrastructure. However, the resources needed are much larger than what the public sector can provide. So, the paper in concern reflects the present position of Indian roads and transportation and the need of Make in India program in this field.

Key words: Make in India, Manufacturing, Hub, GDP, Roads and Transportation

Introduction

Make in India is a special campaign launched by Prime Minister Narender Modi on 25th September 2014 which focuses on Make in India program for global manufacturing hub. Key thrust of the program would be on cutting down in delays in manufacturing projects clearance, develop adequate infrastructure and make it easier for companies to do business in India. On 29th December,2014, a workshop was organised by the Department of Industrial Policy and promotion which was attended by Prime Minister Narender Modi, his cabinet ministers and chief secretaries of states as well as various cadres. The 25 key sectors identified under the program include automobiles, auto components, bio-technology, defence, electronic systems, food processing, leather, mining, oil & gas, railways, roads & transport etc.

Overview: The major objective behind the initiative is to focus on job creation and skill empowerment in 25 sectors of the economy. The initiative also aims at maintaining high quality standards and minimising the impact on the environment. The initiative hopes to attract capital and technological investment in India.Under this initiative, brochures on the 25 sectors and a web portal were released. Before this program was launched, foreign equity caps in various sectors had been relaxed. The applications for licences were made available online and the validity of licences was increased to three years. Various other norms and

procedures were also relaxed. In August 2014, the cabinet of India allowed 49% FDI in defence sector and 100% in Railways infrastructure. The defence sector previously allowed 26% FDI and there was no FDI in Railways. This was done in hope of bringing down the military imports of India. Between September 2014 and November 2015, the government received Rupees 1.20 lakh crores which is $18 billion worth of proposals from the foreign companies interested in manufacturing electronics in India. India is the 4th largest economy in the world. However, one factor which is a drag on its development is the lack of world class infrastructure. Infact , estimates suggests that the lack of proper infrastructure pulls down India's GDP growth by 1-2% every year. Physical infrastructure has a direct impact on the growth and overall development of an economy. As the fast growth of the Indian economy in recent years has placed enormous stress on physical infrastructure such as electricity, railways, roads, ports, airports, water and sanitation, all of which are already suffering from substantial deficit. The goals for inclusive growth and a 9% growth can be achieved only if this infrastructure deficit is overcome.

Infrastructure Development in 12th Plan

Inadequate infrastructure was identified in the 11th plan as a major constraint for rapid growth. The plan had; therefore, emphasized on the need for massive expansion on investment in infrastructure based on a combination of public and private investment. The total investment in infrastructure which includes roads, railways, ports, electricity and telecommunication, oil gas pipelines and irrigation is estimated to have increased from 5.7% of GDP in the base year of 11th plan to around 8% in the last year of the 11th plan.Development of infrastructure is a sine qua non of economic development of agriculture to a considerable extent, on the adequate expansion and development of power and electricity generation, transport & communication. Obviously, if proper attention is not paid to the development of infrastructure, it is likely to act as a severe constraint on the economic development process in the country. Keeping in view, the various plans have focused attention on the expansion of infrastructure facilities.In the 11th plan, investment of US $ 500 billion in infrastructure through a mix of public & private sectors were planned. Investment in infrastructure increased to 6.2% in 2007-2008 to 7% in 2011-12. The 12th plan aims to increase this further to 9%. The total investment in 12th plan is estimated at Rupees 56.3 lakh crores where infrastructure includes:-- Sources and demand of energy, Power & electricity, Coal-oil & gas-Atomic energy, Railways, Air Transport, Telecommunication etc.

Road transport is the backbone of Indian transport infrastructure. It can be classified into the following categories.

1. National Highways :- These roads are the primary roads of the country and connect large cities & big industrial centres. There development & maintenance is the responsibility of the central government. Initially, our road system developed around four main national highways connecting Khyber with Kolkata through Delhi. Kolkata with Chennai, Chennai via Mumbai with Delhi.
2. State Highways :- These roads link all the important centres of industry, trade & commerce of the State & National Highways.
3. District Roads :- These roads connect different parts of the district, important industrial centres & market centres and usually lead to local railway station.

4. Rural Roads :- These roads are found in villages and are usually of two types- pucca roads & kutcha roads.

Importance of Road Transport in India

As compared to railways, road transport has the following advantage:-

1. A large number of places are not connected by railways. Therefore, the only means of transport in these areas is the road transport.
2. Road transport is complimentary to railways. It provides feeder services to goods arriving at a railway station. Goods are despatched to their destination on trucks or other means of transport.
3. Road transport provides door to door service within cities.
4. It is a better means of transport as compared to railways for carrying perishable and less bulky goods.
5. The chances of delay, damage or loss are less in the case of road transport as compared to railways.
6. Road transport does not require heavy capital investment unlike railways.
7. From the point of view of defence of the country, the road network plays a very important role. It is the roads that enable the defence forces to move to areas inaccessible by the railways in the time of need. This is particularly so in the case of border areas and hilly tracks.

Road Development in India

India has the largest roads network in the world, aggregating more than 48.65 lakh kilometres at present. However, this network is not adequate for speedy and efficient transportation. Half of this is made up of non-surfaced roads. The National Highways which are arterial roads have currently a network of 96,214 kms, although they carry nearly 40% goods & passenger traffic. The National Highways network constitutes only about 2% of the total road network.

Three important initiatives in the road sector were undertaken in recent years:-

1. A: -The National Highway Development Project – NHDP deals with building high quality Highways
2. B:- The Pradhan Mantri Bharat Jodo Pariyojna- PMBJP deals with linking up major cities to the NHDP Highways
3. C:- Pradhan Mantri Gram Sadak Yojna- PMGSY addresses rural roads

NHDP Plan

For augmenting the capacity of National Highways, Central Government with the help of National Highway Authority of India as its nodal agency is undertaking National Highway Development Project. The plan envisages six laning of the following roads.

1. Golden Quadrilateral Highway connecting Delhi Mumbai Chennai Kolkata having an aggregate length of 5846 kms.
2. North South Corridor:- Srinagar to Kanayakumari with length of 7142 kms.
3. East West Corridor:- Silchar to Porbandhar.

Expansion of NH System It is proposed that the existing NH Network of 71,772 km may be increased to about 85,000 km in the 12th Plan period. 4.7.2. Development of Non-NHDP NHs . Two-laning It is estimated that there would be about 9,220 km length of NHs having less than 2-lane standards at the beginning of the 12th Plan. It is proposed to develop them to 2-lane NH standards during the 12th Plan. Apart from this, considering an addition of about 15,000 km length in the NH network during 12th Plan, and also keeping in view the likely availability of allocations under GBS, and inter-se priority, it is proposed to develop 2,000 km length of NHs to be declared during 12th Plan to 2- lane NH standards. The mode of implementation has been estimated broadly as per the following break up: - Through GBS (including toll remittances) - 5,100 km Through proposed World Bank Loan Assistance - 3,770 km Through Private sector funding on BOT (Toll) mode - 2,350 km Further, feasibility may be explored to put maximum lengths of stretches developed through GBS or proposed External loan assistance on Operate-Maintain-Transfer (OMT) Contracts after their development. - 7 - Document. Four-laning / Six-laning Existing 2-lane NHs are to be developed to 4-lane divided carriageway facilities or more as per necessity only as fully access controlled facilities with closure of all median openings, replacing of all at grade intersections by grade separated intersections, providing vehicular, pedestrian and cattle underpasses, segregation of slow moving traffic by providing service roads / alternate road connectivity wherever required, etc., from Road Safety point of view. In case it is not possible to do so, feasibility shall be explored to develop separate fully access controlled facilities, i.e. expressways (either as a green field project, or along any other feasible alignment) having 4 or more lanes with divided carriageway if the traffic on the existing 2-lane NH corridors exceed its design service volume. It is envisaged that leaving apart the ongoing phases of NHDP (viz. NHDP-Phases-I to VI and NHDP-Phase-VII), there may be requirement to upgrade about another 200 km length of NHs to at least 4-lane divided carriageway facilities. It is recommended the possibility may be explored to develop these entire lengths of NHs to 4-or more lane standards through PPP mode. . Riding Quality Tentatively, it is estimated that Riding Quality of about 5,000 km may need to be improved during 12th Plan. . Bypasses and Over Bridges For cities with population above 1 million on the NH Network, it is recommended that a desirable strategy would be to plan for bypasses in the form of peripheral expressways to interlink the highways radiating from these cities. Further, there should be no railway level crossings on NH Network and all existing level crossings on NH Network should be replaced by Road Over / Under Bridges. A phase-wise programme may be drawn up accordingly depending upon the traffic and number of gate closures. . Bridges A system of maintaining and updating database on Bridge Inventory and their conditions needs to be set up for enabling timely decision making regarding formulating their maintenance strategies. Development of Bridge Management System (BMS) may be considered to be set up in a time bound manner for this purpose. - 8 - Document. Amenities It is important the wayside amenities be integrally planned and developed along with Expressways and all projects for 4-laning / 6-laning of NHs. Due provision is required to be made for LA, etc. while conceptualizing and preparing such project reports. If the project is to be developed on BOT (Toll) basis, the concessionaire may develop the facilities and operate the same during the concession period or even after that. For projects developed through BOT(Annuity), Concessionaire may develop the facilities and the Government may consider entrusting operation and maintenance of the facilities through private participation. For projects developed through GBS funding, the facilities

may be integrally developed by the Government and entrusted to private sector for operation and maintenance. Broadly, the Integrated Way-side amenities may have following features: - o Facilities to be owned by Government operating / construction agencies. o Operation & maintenance of individual facilities in the wayside amenities through lease on profit sharing basis with private companies. o Earmark certain facilities in the wayside amenities exclusively to encourage local small scale producer on subsidy basis. o Due consideration for preservation of ecology and environment including recycling of waste water and harnessing of alternative sources of energy (e.g. solar energy) for captive use. Further, wherever feasible, State-of-Art Traffic Control Centres shall be provided (especially for stretches developed on BOT basis through Public-Private Partnership) along with facilities for information dissemination and exigency management system for alleviating traffic congestions, promoting more environment friendly, energy efficient and safe travel. For Expressways as well as any other access control facilities, these provisions should be made mandatory

Funding Plan for Development of Roads

Roads are primarily funded through budgetary allocations. Central Government provides funds to National Highway Authority of India and to State Governments for other roads. Presently, the total allocations available for Central & States road development are to the tune of Rupees 110 billion which is just 42% of total transportation revenues received by the Government. This implies the inefficiency of our system which consumes 58% of the total revenue received by the transport sector.

The following table shows the quantum of investment expected to be infused in three years:-

Investment in NHDP

Particulars	FY01	FY02	FY03
Quadrilateral	19.5	59.0	87.2
Corridor	7.3	8.1	7.9
Total	26.8	67.1	95.1

Financing Plan for NHDP

Source	Rupees Crores
Total Cost	54000
Cess on Petrol& Diesel	20000
Extended Assistant	20000
Market	10000
Private Sector Participation	4000

Source: Reports, NHDP

Maintenance of National Highways

In order to reduce this total transport cost it is essential to maintain the roads at a good level of service. The basic cause for poor management of National Highways is a lack of funds made available for maintenance as per norms. They do not exceed 60% of normal requirements for main roads. Maintenance being a non-plan activity there is also a tendency by the Government to apply adhoc cuts in the face of resource constraints. - 15 - Document4 The issue needs to be urgently addressed to prevent premature failure of sections of NHs developed at large capital investments on account of self-accumulation of deficiencies due to thin spreading of available resources for M&R on large NH network. There is necessity of providing adequate allocation of funds for M&R of NHs either during B.E. stage or sufficiently early in the Financial Year are commensurate to the requirements. The following suggestions may also be considered in this context: - Develop sound "Maintenance Strategies" with planned interventions of maintenance inputs. Do away with traditional system of funding M&R activities under non-Plan and take up M&R under Annual Plans separately segregated from construction. Ensure assured funding for development as well as maintenance and repair of NHs so as to enable taking up of preventive maintenance works rather than the compulsion of presently resorting to only reactive maintenance works. Take up short term maintenance works on already developed stretches through private sector on Operate-Maintain-Transfer (OMT) basis, which are targeted for further upgradation in say within about 4 ~ 9 year period. Long term O&M Contracts is a preferred mode and therefore Performance based maintenance system to be adopted for non NHDP developed reaches as well which may include Incident management. Increase cess on petrol and High Speed Diesel (HSD) oil suitably from present level of Rs. 2 per liter and mobilize additional accrual entirely for National Highways. The Government may consider levy of cess on petrol and High Speed diesel (HSD) oil as per the provisions of the Central Road Fund (CRF) Act, 2000 on ad-valorem basis in place of the current policy of charging it at Rs. 2.00 per litre of petrol and HSD oil. The resource thus generate could be partly used for M&R of NHs. Develop a system of maintaining and periodically updating the database on inventory of roads, bridges and other structures on NHs including their condition as decision support system for prioritizing development and maintenance works, viz. Pavement Management System(PMS) and Bridge Management System(BMS). Reorganize maintenance operations by replacing the road gang with mechanized mobile units to improve the productivity of the existing labour force. Encourage use of equipment for quick repairs of potholes, slurry seal machines, combined bitumen sprayer and chip spreader and cold/hot recycling plants to improve the maintenance culture

Key Issues facing the Sector

In spite of all the concessions, private sector participation has been below the expected level. This is primarily due to reasons like reluctance of the private sector to participate in long term prospects, land acquisition problems and difficulty in toll collection in the operating phase in certain stretches. Although the Indian transportation infrastructure is one of the largest in the world, it is far from being the best. The population of the country is almost four times of USA and has the highest growth rate in the world. The existing transportation system is not adequate to sustain the current rate of economic & industrial development in the country. Demand has constantly outstripped the supply of transportation over the last fifty years. As compared to USA, the amount of freight traffic carried by highways in India

is quite meagre. This is partially due to poor surface quality of the roads. The Indian automobile industry today manufactures a large variety of multi axel vehicles with turbo charged engine but most of these are exported. The Indian industry needs large freight carriers to transport goods at low costs but the inefficient load infrastructure acts as an economic bottleneck impeding the growth of both segments of these industries. Indian automobile industry has necessary facilities to manufacture these multi axel vehicles but poor Indian infrastructure acts as a barrier for the sale of these big freight carriers within the country.

Network connectivity :- Achievement of high network connectivity is usually the first step in infrastructure development. The current road plan aims at achieving a level of adequate road connectivity.

Travel Time :- The average speed on Indian Highways is around 45 kms per hour which is far less than the speed on USA Highways.

Investment Needs Amount in Rs. crore Sl No. Scheme Estimated Fund Requirement for 12th Five Year Plan 1 External Aid 10,980 2 NH (O) Widening to 2-lanes, Strengthening, IRQP, Bridges, ROBs, Bypasses, etc. 37,540 Development of Expressways 11,295 3 Works under BRDB 3,000 4 Other Charges & IT 40 5 Strategic Roads under BRDB 500 6 R&D and Training 100 7 Charged Expd. 30 8 NHAI (Investment) (Cess) 54,898 9 Remittance of toll receipts 28,797 10 NHAI (ABS for J&K package, etc.) 7,771 11 E&I for States/UTs from CRF 1,664 12 Special Packages (i) Special Accelerated Road Development Programme for North Eastern Region, including Arunachal Pradesh Package 37,674 (ii) Special Programme for development of road connectivity (NH and State Roads) in LWE Affected Areas 16,076 (iii) Development of Vijayawada-Ranchi Road (State road portion) 1,100 (iv) Special Package for development of roads in the Scheduled Areas (under Fifth Schedule) under Tribal SubPlan 5,000 (v) Special Programme for development of State roads for DMIC Project for Maharashtra and Rajasthan region on pilot basis 14,425 (vi) Special Package for development of State roads in the State of J & K from strategic considerations 700 (vii) Special Package for development of road connectivity for about 50 minor ports 5000 (viii) Special Package for development of road connectivity for 24 Airports 1800 (A) TOTAL GBS+Cess+Toll remittances+ABS for J&K package + Special Packages 2,38,390 (B) IEBR / Borrowings by NHAI 66,680 (C) Grand Total 3,05,070 Private Sector Investments (Non-NHDP) Widening to 2-lanes 5,765 4-laning of NHs 1,610 Development of Expressways 4,140 Sub-Total – Private Sector Investments (Non-NHDP) 11,515 - 30 - Document4 Private sector Investments (NHDP) 1,66,738 (D) Total Private Sector Investments 1,78,253 (E) Grand Total for Central Sector Roads (incl. Private Investments) 4,83,323 The above includes total Tribal Sub-Plan (TSP) Component of Rs. 9,900 crore [which is about 4.15 % of the total projected budgetary allocation of Rs. 2,38,390 crore (ref. Col (A) in above table) for Central Roads Sector] However, it is pertinent to mention that the cost of LA and R&R (which have been assumed as Rs. 1 crore per Ha) may escalate significantly consequent to promulgation of revised legislations by the Government in this regard, for which necessary actions have already been taken up. Sources of funds: - Amount in Rs. Crore Cess External Assistance GBS ABS for SARDPNE and J&K ABS for Special Packages* IEBR Estimated surplus from Toll Revenue Share of Private Sector 54,898 10,980 54,169 7,771 81,775 66,680 28,797 178,253 * - viz. SARDP-NE including Arunachal Package, development of roads in LWE affected

areas, development of Vijayawada-Ranchi Road, development of roads in Scheduled Areas (under Fifth Schedule) under Tribal Sub-Plan, development of road corridors of DMIC Project on Pilot basis, development of State roads in J&K, development of road connectivity to 50 minor ports, development of road connectivity to 24 Airports, etc. Rs. 7,771 crore (2%) Rs. 81,775 crore (17%) Rs. 54,169 crore (11%) Rs. 10,980 crore (2%) Rs. 54,898 crore (11%) Rs. 66,680 crore (14%) Rs. 28,797 crore (6%) Rs. 178,253 crore (37%) Cess External Assistance GBS ABS for SARDPNE and J&K ABS for Special Packages* IEBR Estimated surplus from Toll Revenue Share of Private Sector.

Road Safety and Research & Development

Road Safety - Standards and Guidelines for Highways and Urban Roads Highway and urban road design standards and guidelines will be made consistent with the safety requirements and in tune with the international best practice. All existing standards/guidelines/ manuals/codes, etc., of IRC/MoRT&H will be reviewed for their specific Focus to Road Safety, and deficiencies/shortfalls identified in relation to safety. New standards and manuals will be prepared for filling the gaps in the current standards. There should be adequate engineering measures supported by strict enforcements to ensure segregation of fast and slow moving traffic, especially on the multi-lane (i.e. having 4-or more lanes) highways. To that extent the Project Scopes defined in the Concession Agreements of projects being undertaken under various phases of NHDP need to be adequately reviewed. This should also apply to the O&M contracts / OMT concessions. All road projects being delivered at present (either at planning stage, design stage, construction stage, or even at implementation stage and operation stage), whether on BOT or as Item Rate / EPC Contracts, will be reviewed at each stage to identify any issue related to road safety. All State Highways and National Highways are to be provided with both pavement markings and road signs as per the requirements specified by the standards of IRC/MoRT&H. These shall be mandatory requirement for road safety. Initiatives are required to be taken for taking up adequate State-of Art Traffic Calming Measures in the relevant areas / places, especially in urban areas, near habitations, etc. for enhanced safety to vulnerable road users. For ensuring the construction zone safety for traffic operation, there should be proper estimate prepared at the stage of Detailed Design, and it should be part of the total project cost like any other item in the form of BOQ items. Monitoring and evaluation of road designs and traffic management strategies Road Safety Audit should be made an integral part of the project planning, report preparation, appraisal, designing, implementation, operation and maintenance, etc. The project should be duly reviewed and necessary corrective actions should be taken pursuant to the report of the Road Safety Audit at every stage. The entire network of NH and SH are to be subjected to Road Safety Audit (RSA) in a planned and time bound manner. The RSA shall identify all the potential hazards in terms of deficiencies observed in the network, which are required to be corrected on continuous basis for making the road network safe. The States and MoRTH will prioritize the network to be audited, and will implement the improvements recommended by Road Safety Audit. The priority roads with high accident records are to be taken up first in a time bound manner. To carry out Road Safety Audit (RSA) for the entire primary network, required capacity is to be developed through proper training of qualified engineers, who are eligible for training. For this purpose, a special committee will be set up to draw up guidelines for a RSA procedure suitable for Indian traffic and safety issues with special

reference to vulnerable road users by December 2011. Teaching and research institutions including IITs, NITs, CSIR, etc. will be identified for establishing training programmes for RSA professionals. Road Safety Audit is to be carried out for the roads using the trained auditors available in the country and in accordance with the manual of Road Safety Audit adopted by IRC. All steps of audit delivery including the initial meeting and audit completion meeting with the Client must be completed with submission of audit report and exception report etc for every road assigned for audit. This will bring out what all is required to be done for the road ensuring highest level of safety. No compromise, whatsoever, should be made in essential road safety features and all safety concerns must be addressed as per the recommendations of the Road Safety Audit Report. This aspect needs to be critically considered especially while analyzing project viability. Encourage Institutionalization of conducting Road Safety Audits by certified Road Safety Auditors. An accreditation body is required to be created for Road Safety Auditors, which will control the utilization of these trained auditors and will maintain the register of certified auditors. Such auditors will have to undergo training and retraining as per a set of guidelines to maintain a high standard of auditing. Capacity for Road Safety Audit works in the country is to be enhanced by training and conducting certifications courses for Road Safety Auditors.

Accident Investigation : Accident data recording system is to be adopted uniformly across all States for roads in urban and non-urban areas in a standard - 41 - Document4 format. This standard format is to be evolved with national consensus and should include all rational data that are required for accident investigation, accident reconstruction, and also adjudication of the accident cases. The data collection should be tech-savy with hand-held GPS and computer interface so as to collect all data with highest precision. There will be standard accident analysis module for accident investigation and adjudication uniformly to be used across the country without any exception. Only a few specialized centres shall study selected accidents, using the accident reconstruction technique, etc. and the same data system. Institutionalized System of Database storage shall be developed.

Training: The engineers involved in planning, design, construction and operation of roads and highways in the country are to be trained on road safety aspects covering engineering measures, safety at construction sites and hands on experience in road safety audit. Research & Development related to Road Safety To establish about five to seven Centres of Excellence for Road Safety Research and Accident Analysis in Academic Institutions across the country in addition to the existing research institutions. The capacity in road safety research and accident analysis is also to be developed, for which bright young professionals are to be identified for specialized training. National Road Safety & Traffic Management Board Government is already initiated the process of approving the Bill for creation of a Road Safety & Traffic Management Board. This Central Body is an urgent requirement along with the counterparts in the States. Institutional Arrangements for planning, delivery, evaluation, monitoring and improvement The concerned Road Agency should be made responsible for the planning, delivery, evaluation, monitoring and improvement with specific focus to road safety. For this purpose, it is of utmost importance that necessary institutional arrangements be developed within a fixed time frame. Inter-Disciplinary Coordination It is very important to establish synergy between various stakeholders at various levels (i.e Central, State, District, etc.), which is presently missing, e.g. between the engineering authorities (viz. Road Agency, R&D / Academic organizations,) enforcement authorities (viz. Police, State

Transport Authorities), organizations responsible for emergency care (viz. M/o Health & Family Welfares, Hospitals, Trauma Care Centres, etc.). The focus should be to establish a robust mechanism to address road safety issues in a comprehensive manner. Availability of Resources Adequate funds should be made available commensurate to the requirements, especially for development and maintenance of non-NHDP National Highways Network. It needs to be appreciated that in the absence of required allocations, there is inevitable compulsion of compromising with many of the essential features and requirements which have significantly adverse road safety implications. Similarly resources provided for State roads shall have to be commensurate to the estimated requirements. . Capacity Building in Safety Administrations Due emphasis is required to be given to fast track capacity building of all stakeholders and organizations associated with Road Safety aspects. Further, these aspects shall also have to essentially reviewed on a continuous basis for needful adaptation with changing environment and evolving State-of-Art practices. Research & Development (i) Specific R&D schemes need to be taken up for possible adaptation of State-of-Art innovative technologies and materials in the highway development and maintenance in Indian context. Field / Pilot testing of such technologies / materials may be taken up under ongoing projects under NHDP, SARDP-NE, and other projects to test their efficacy and for enabling their adaptation. (ii) Possible use of waste materials / by-products, etc., in highway development and maintenance by necessary treatments for their qualitative improvements (if required) should be explored and R&D should focus on adaptation of such technologies corroborated by field testing in a time bound manner. Further, recycling of pavement materials should be also considered. These suggested measures are considered to be very important considering the depletion of natural resources such as aggregates, etc., besides their adverse effects on environmental degradation. (iii) The R&D schemes, having immediate practical relevance in the context of the initiative of the Government to develop highways in the country, needs to be taken up on priority. (iv) There are Committees in IRC for giving accreditation to new materials / technologies, etc. However, in numerous occasions, the general experience is that there are reluctance on part of executive agencies to allow field testing of these new technologies / materials, etc., as a means of their performance evaluation for enabling taking up of further necessary action for their possible wider use in the sector. It is important that the Government encourages field testing of such new technologies / materials, etc., accredited by the IRC Committees, by the executive agencies.

Conclusion

In the end I would say that our Prime Minister, Narender Modi gives a hope to significant & sustainable growth in manufacturing sector & making India a manufacturing hub which will become double if the infrastructure of economy will develop and attain the required levels.

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