**Paper reviewed: Financial Impediments to Road Infrastructure Development in India**

The research paper focuses on the financial barriers to road infrastructure development by means of both statistical data, and studies using reliable sources, with special emphasis on private sectors as a viable means to fund road development projects and why they fail due to various circumstances. The paper begins to elaborate on the importance of roads for a country like India, which is in its developing stage, while also attributing the increasing needs of roads to both a growing requirement of transportation due to more prospering businesses, and to accommodate the greater travelling demands of people. The authors of the material also focus on the importance of the involvement of the private sectors, and the fundings provided by them, while referring to Private-Public Partnerships as one of the appropriate infrastructure financing techniques, which eventually turned out to be the new normal for such projects. However, it also claims that the road infrastructure faces a severe lack, in contrast to the ever-increasing population, and even the projects which have seen its roots in the form of bids and investments by companies to claim the helm of the project eventually lead to a stalemate due to lack of proper management. The reviewed material then proceeds with 4 case studies, following which they talk about the Financial, Legal and Operational impediments as the three major barriers to road infrastructure development. Finally, the authors analyse various business models, and give recommendations such as reusing existing projects to fund future projects, setting up a road infrastructure fund and raising capital through the bond market.

**Paper reviewed: Public Private Partnerships in Roads Sector in India**

The reviewed material starts with a highlight of why road transport, especially national highways, is an important asset of a nation- with data suggesting national highways contributing to 2% of India’s road network, but catering to 40% of the traffic. It attributes the failure of a nation to the failure of its internal trade because of lack of proper road infrastructure. The source material then moves on to expound on the Highway Development projects, starting with the National Highway Development, which has two main flagship projects as a part of the kickstarting of the National Highway Development Programme (NHDP, 2001)- Golden Quadrilateral (NHDP Phase 1) and NSEW Corridor (NHDP Phase 2). It then proceeds to explain the other highway development projects like the State Highways, Rural and Urban Roads under the Prime Minister Grameen Sadak Yojana (PMGSY) and the Hinterland roads (connectivity to the North East Indian regions) (however, the literature does give the reasons the developments of these roads face barriers- lack of concerted efforts, political and other interferences, etc). As the second aim of the research paper, the authors focus on 3 major topics:

1. Institutional Framework- that broadly categorises Institutions for road infrastructure development into Development Institutions (e.g., NHAI, MoRTH, Private Developers and Contractors and related subcontractors, etc.) and Financial Institutions (e.g., Central and State Government (using Budgets), Banks and Financial Institutions, Central Road Fund, etc.);
2. The National Highway Programme, its related budget allocation and the related logistics for the same;
3. Modes of investments in Highway/Road development including government allocated budgets, private-public partnerships and financial institutions.

The third, fourth and fifth objectives of the literature focuses on private involvement in infrastructure projects. It goes over the incentivisation of private funding in road projects, the models by which this can be implemented (like the Viability Gap Funding (VGF) and the Model Concession Agreement (MCA)), etc., that would attract more Private Public Partnerships (PPPs), so that faster rates of completion could be made possible using private fundings and resources. Lastly, the authors cover the setbacks faced by road infrastructure projects, with specific highlights to “systemic issues” (land acquisition delay/denial, regulation clashes, etc.), “structural issues” (like not being able to acquire long term finances, project risks and sunk costs, lack of proper resource allocation etc), “behavioural issues” (like overenthusiasm of activists, over-reliance on the BOT model, etc).

**Paper reviewed: Rekindling private investment in roads and highways**

The reviewed literature starts with a brief history of Private-Public Partnerships in the road infrastructure sector in the mid 1990’s. It claims that the under the National Highway Development Programme of 1998, the 23000km of roads (out of a grand total aim of 50000km+ roads) that was to be started using the PPP model had a slow pace initially, due to the lack of proper PPP framework and lack of competition, however, the pace increased after the introduction of the standardised PPP framework in fiscal 2006. However, the analysis conducted also shows a sharp fall in 2013 due to a slow global economy, land acquisition problems, the aggressive bidding by private sectors and the optimistic traffic projections by the developers. PPP models, however, are claimed to be the one of the optimal means to complete a project, because it takes into its use the efficiency, asset creation and control, and management of their services. The authors then address the need for PPPs, and the obstacles on the Private Sectors front, with an example of the cost disparities faced in the Bharatmala Paryojana, despite the fundings from the Private Sectors, thereby requiring an analysis of the impediments faced by the private companies. These impediments include constraints in financing and the stringent policies preventing banks from investing in infrastructure, obstacles in land acquisition (like relocation of settlements, religious locations, deforestation etc., and the time consumed for clearances), aggressive bidding by Indian developers and pending claims to the NHAI (leading to a stretched balance sheet), and other changes in macroeconomic parameters, lack of pre-project assessment, etc. are the reasons for overall failures of the PPP models.

Consequently, to combat these shortcomings and in order to attract greater investments from private sector firms, the authors of the reviewed material have suggested several ways to mitigate losses as far as possible, including remuneration from the NHAI for failing BOT model projects, increasing the release of construction grants for more efficient timelines on the side of the developers, completion of a large percentage of land acquisition before the project is started, to prevent any delays after the start of the same project, etc.

**Paper reviewed: Paving future roads for India**

The reviewed material starts with the lifecycle of a road project, mainly involving planning & design, construction and operation & maintenance as the broad processes. The paper then covers three key areas of advancements in road infrastructure: Making the project environment friendly, faster construction rate and more efficient lifecycle cost management (however, with a cautionary statement that not all 3 may be achieved simultaneously for a given project). The authors then move on to the different means of sustainable practices while building roads, like use of plastic wastes for better plastic disposal, but also to ensure better durability, stability and strength of roads; self-healing asphalt (using iron-oxide nanoparticles, steel fibres, etc.) is another technique being developed by scientists to produce asphalt that heals itself in the event of any damage, this will allow any maintenance investments and resources to be avoided, thereby optimising the use of allocated funds properly. The reviewed material also elaborates on the concept of smart roads and ATMS (Advanced Traffic Management Systems) that can be used to predict traffic in a region accurately, which, in turn, can be used to determine the pre-project data for a new road in that region more realistically. Finally, the source also explains the Project Monitoring Information Systems (PMIS), which is essential in keeping track of the project and its different phases of execution.