



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 5, May 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.488

 9940 572 462

 6381 907 438

 ijircce@gmail.com

 www.ijircce.com

Length of National Highways and Information Analysis

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ABSTRACT: The background for this is the economic liberalization that began in 1992. The National Highway Development Program (NHDP) was the first major program launched in 1997 to develop a large road network across the country. Public-private partnerships (PPPs) have been adopted as a means of developing roads and highways in India since 2001, in the face of the greatest challenges and the need to capitalize on private investment in the sector. According to him, a large number of contracts were awarded under the PPP Build, Operate and Transfer (BOT) variants and other PPP models. This article first discusses the progress of the road and highways sector in India in terms of the approach taken and then highlights some of its main features. Finally, the main problems and challenges that have arisen in the sector are also discussed.

KEYWORDS: Highway Development, Statistical Analysis, Economy.

I. INTRODUCTION

Roads and highways are an important asset, through which the nation moves.. They carry about 65% of freight and 85% of passenger traffic in India; it is estimated that the road traffic has been growing at 7-10% per annum. Among all types of roads, highways that connect various parts of the country are considered to be more important. National Highways (NH), for example, constitute only about 2% of total road network but they cater to nearly 40% of the road traffic. Roads and highways are considered to be a major infrastructure that impacts on the economic landscape and prosperity of a country. Besides, providing mobility to people, they provide much needed infrastructure for the movement of goods and services so that the supply of them meets with demand points.

In fact, some countries are struggling to make an impact on world trade markets because of their poor road and motorway network and conditions. Poor road connectivity makes it very expensive (due to long time, higher risk and more hours spent working in transport), sometimes even impossible for manufacturers to reach international markets. Poor road quality can also make it difficult to move goods and services in and out of the country.

II. LITERATURE SURVEY

Roads and Highway Development in India

India's road network (including highways) is one of the most extensive, with a length of approximately 3.34 million km, including national highways (65,569 km), state highways (1,30,000 km) and other roads. (Main roads of the district, rural and urban roads Roads (3.14 million). Highways are an important segment of the road network due to their higher share of passenger and freight transport. India has long neglected the development of its highways, but has gained boost after the establishment of the National Highway Authority of India (NHAI) as a nodal agency in 1997. The launch of the National Highway Development Program (NHDP) in 2001 gave a major boost to road development, especially through two main initiatives: the Golden Quadrilateral (GQ) (hereinafter referred to as the NHDP Phase 1) and the North-East-South-East Corridor (NSEW) (hereinafter referred to as the NHDP Phase 2). The above initiatives have contributed to a significant leap in the length of the highway.

This further strengthened the expansion of the NHDP in several phases (phases III-VII), in particular in improving the capacity of the bands, transforming the existing 2 and 4 bands into four and six bands. In addition to the development of national highways within the NHDP, the development and maintenance of approximately 41,290 km of NH is done with budgetary resources. These NH sections are run by the state departments of public works (PWD) and the Border Roads Organization (BRO). These highways have been awarded with development works for: (i) Improving the quality of roads



(ii) Extension to 2/4 lanes (iii) Strengthening roads (iv) Construction of bypasses (iv) Rehabilitation / construction of bridges

State highways

While national highways linking different parts of the country, road projects linking different parts of states are carried out by state governments with the technical and financial assistance of international credit agencies, for example, the World Bank, the Asian Development Bank and Bank of Japan for International Cooperation. Some state governments - Tamil Nadu, Maharashtra, Andhra Pradesh, Kerala and Orissa - have been at the forefront of this. In addition, several states have set up state road development corporations and entrusted them with this responsibility. Some areas of state highways are also developed and maintained by some states with their own budgetary resources.

Rural and urban roads

The Government of India has given priority to road connectivity in rural areas through Prime Minister Grameen Sadak Yojana (PMGSY), which is a system designed to provide road connectivity to rural areas with direct government funding for panchayat. Therefore, panchayats receive additional funding for this purpose, and progress is monitored by the Government of India. Urban roads are developed and maintained by those local governments, but not enough concerted efforts are being made to make them work. The opening of some segments, for example, arterial roads, highway diversions, highways, bypasses gives rise to a major overhaul in some of the big cities.

Hinterland Roads

Another important road development project carried out by the Government of India is the Accelerated Road Development Program (ARDP) in the North East (NE), which aims to improve road connectivity to remote locations in the NE region. This project has as proposed objectives (i) 2/4 lanes of approximately 5,174 km of NH and (ii) 2 lanes / improvements of 4,589 km of SH.

Road and Highway Development Phases

The development of roads and highways in India was initially carried out by various institutions operating at different levels of government. As this conventional method did not produce much results, the National Highway Authority of India (NHAI) was created as a special vehicle in 1997 for the development of roads in India through NHDP. Phases I and II of the NHDP were carried out to stimulate the country's economic development. Subsequently, it was extended to several phases involving different types of infrastructure asset development. In the early stages of highway development, NHAI used the traditional procurement model for engineering, procurement and construction (EPC) contracts, which involved road builders with a limited role only in executing the project. Subsequently, it began to involve private sector actors by signing long-term concession contracts involving BOT variants for several sections of national motorways. NHAI has received more independence to select and implement projects to help rapid development, seeking private sector participation.

Highway/Road development Financing

The development of highways and roads is a capital-intensive infrastructure that requires a lot of money. In the early stages of motorway development, much of the funding came in the form of a grant from the Government and the Central Road Fund (CRF), which was set by charging for the interruption of petrol and diesel consumption. However, the Government has realized that the investment needs for highway development are high and would require the flow of private investment. In this context, private sector participation has gained momentum, and projects are increasingly being launched using PPP models that bring in private sector investment (Govt of India 2009).

National financial institutions (DFIs) have an important role to play in this scenario, as they are the main funders of road projects. DFIs may be exposed to this sector because they fall into the infrastructure category, and lending rules for the infrastructure sector are favorable to banks and financial institutions in accordance with RBI guidelines. In addition to banks and other formal financial institutions, private creditors and other debt providers (including NBFCs) also invest / lend to private developers. In some of the projects, the participation of strong funds in the capital also appeared. The last form of support comes from subcontractors and suppliers (equipment and materials) who commit their assets or promise to support private developers in the bidding phase of the project to obtain preferential status and also the treatment in awarding the project.

However, after recognizing the importance of strong cash flows, the Government started lending to private developers for the execution of road development projects. India Infrastructure Finance Corporation Limited (IIFCL) provides direct loans for road projects. IIFCL was initially set up with a capital contribution from the Government, but was later

authorized to raise public funds by fluctuating securities. IIFCL has successfully raised public funds through a series of bonds and continues to lend to the road development sector. Finally, the government has also initiated the Infrastructure Debt Fund (IDF) as a safer and longer-term financing option for infrastructure development, including the development of motorways / roads.

Roads and Highway Infrastructure: Issues and Challenges

By adopting PPP models in the early stages of development, India has made significant progress in the development of roads and highways in terms of the established network. The expansion of the road / highway network in India has increased substantially following the involvement of the private sector and the adoption of the PPP framework. The impact of PPP was particularly high in development phases III - EPC • The first model that induced private sector forces • Suitable for green projects • Revived again after depletion of private investment and BOT / BOOT distance projects • Concession models are very popular and variants have also appeared • Suitable for greenfield and brownfield projects • More possible variants - fee, annuity, Hybrid Annuity • New addition to current development models • Suitable for operation and maintenance projects • Take-off with a network created with multiple variants Contracts • Conventional development model followed by government • Suitable for road intersections, intersections and furniture • Performance-based contracts focus

MEDC Economic Digest, Volume II, no. 4, pp 13-17 [December 2019] © Maharashtra Economic Development Council (MEDC) 6 MEDC Economic Digest Special Edition on Economic Infrastructure VII, when most projects were on the PPP route. In addition, the Government of India has adopted other enabling provisions, such as the simplification of project authorizations through the PPP Evaluation Committee, as well as the formation of a PPP cell to allow the adoption of the PPP model. Model concession contracts (MCAs) have also been drawn up for road projects. All these measures and the favorable treatment given by the government should increase adherence to PPP projects. However, there are several problems and challenges facing this sector.

Although PPP models have contributed to attracting road and motorway projects and investments, the initial provision is declining. Infrastructure projects, such as road development, are likely to face a variety of risks at different stages of projects that create obstacles. Participants in the road development project were not fully aware of these risks and were victims of some of them and experienced failures. As a result, some of the projects could not take off, even after they started.

In addition, some companies that were new to industry and business could not comply with industry terms and operations. They realized that the sector pays fast dividends, but projects of this type are long-term and require a patient and persevering attitude to achieve results. The long waiting period and the lower profit margin (than expected) have prevented some development companies from getting involved in other road development projects. In addition, some companies have purchased enough orders for the order portfolio to be complete and have not been able to execute / bid for other projects because they cannot scale their activities.

The lack of secure long-term funding was another reason why some of the projects failed to take off and some companies abandoned the projects. Although financial institutions borrowed in the early stages, their exposure to this sector also became saturated and there was a perception among financiers that the risks of the project were real and this compromised the bank credit itself. There was a lack of enthusiasm among developers due to the change in the external environment which was extremely volatile, for example, political instability, rising inflation, legal issues and growing challenges at the implementation level. Due to various obstacles encountered in PPP / concession projects, some of them were unable to take off from the ground.

III. PROPOSED ANALYSIS APPROACH

It has been a year of consolidating the gains from major policy decisions over the past five years, a time to monitor ongoing projects, confront obstacles and add to the already significant pace of work in recent years. In the period 2018-19, projects were covered covering approximately 5,494 km in length and a conclusion was reached on approximately 10,855 km of road extension. The road development rate has increased significantly from about 11.7 km in 2013-14 to about 30 km now. During the current year, 3211 km long and 5958 km long projects were awarded by November 2019.

Throughout the year, the Ministry and its associated organizations have done good work in previous years, expanding the country's national road network, taking various measures to make these roads safe for passengers and making every effort



to minimize the negative impact on the environment. As a result, the length of national highways (NH) increased from 91,287 km in April 2014 to about 1,32,500 km. on 12.31.2019.

Construction of National Highways

Year	Award (Km)	Construction (Km)
2019-20*	3211	5958
2018-19	5493	10855
2017-18	17055	9829
2016-17	15948	8231
2015-16	10098	6061
2014-15	7972	4410

Accelerated Development of Highways

The Ministry has propose to develop 60,000 km of national highways in the next five years, of which 2,500 km are express roads / controlled access roads, 9,000 km of economic corridors, 2,000 km of coastal and port connectivity roads and 2,000 km of border roads. / strategic highways. The Ministry is also improve connectivity tourist destinations and build bypasses for 45 cities during this period.

They spending increased from Rs 33,745 crore in 2013-14 to Rs. 1,37,354 million in 2018-19. During the current year, an expenditure of Rs. 85,275 million have already been supported by November 2019, including NHAI IEBR.

Augmenting Finances through Innovative Instruments

To increase funding sources for NH projects, NHAI intends to raise rupees in one million rupees through the Toll-Operated-Transfer (TOT) asset monetization model over the next five years. The finances are likely to come from the securitization of tax revenues as well as the creation of the Infra Investment Trust (InvIT). Other measures taken by the NHAI include the financing of new projects through SPVs supported by the National Investment and Infrastructure Fund (IFRS).

Toll Operate Transfer (TOT) and Securitization of user fee receipts of NHs

In order to expand the project base available with NHAI to generate money in TOT mode and to raise funding against tax revenue from hybrid / publicly funded annuity (HAM) model projects through securitization, the Economic Affairs Committee (AECB) has granted the following approvals (see Communication no. CCEA / 20/2019 (i) of 25.11.2019):

The NHAI is authorized to monetize publicly funded NH projects that are operational and charge a fee for at least one year after the COD through Toll Operated Transfer (TOT), on a case-by-case basis.

NHAI is authorized to vary the concession period from 15 to 30 years, depending on the characteristics of the project.

Detailed proposal for each TOT package, including the proposed project sections; The estimated amount of the concession and the proposed concession period must be approved by the NHAI Council (Authority).

The NHAI is allowed to raise long-term funding from banks, securitizing users' fees from fees, as an alternative way to monetize assets.



Securitization would provide an alternative way to raise funding against tax revenues from projects identified with publicly funded / HAM. Securitization as a model involves the generation of initial funds against future cash flows generated by the selected assets.

Infrastructure Investment Trusts

- In order to improve the mobilization of NHAI resources, the Office granted the following approval (see Communication 39 / CM / 2019 (i) of 13.12.2019):
- NHAI is authorized to establish Infrastructure Investment Trust (s), in accordance with the Invit guidelines issued by SEBI, to monetize completed national highways that have a toll collection history of at least one year and NHAI reserves the right to charges tolls on the identified highway.
- NHAI is authorized to incorporate SPVs, which are essential and an integral part of the entire structure of InvIT.
- NHAI is authorized to establish its first INVIT in accordance with the structure approved by the NHAI Council and to incorporate two SPVs that are essential and an integral part of the Invit structure:
- An SPV to hold all publicly funded projects identified for placement in an InvIT
- An SPV to act as an investment manager on the proposed Invitation
- NHAI is authorized to create a reserve fund with the amounts received from Invit, which must be kept in a separate account for debt repayment.

Progress of Major Programmes/ Landmark Projects

The works on the main bridge over the Sharavathi basins, the approaches between Ambargodu and Kalasvali in Karnataka and 16 packages from the Trans Rajasthan highway project were awarded.

A three-lane underpass opened at the intersection of Parade Road near Manekshaw Center at NH 8 in New Delhi on 12.07.2019. With the opening of this underpass, the movement of traffic from the airport to Dhaula Kuan remained without signal.

The Dasna-Hapur section of the Delhi-Meerut highway (package-3) in Pilakhuwa, Uttar Pradesh was opened by Hon'ble Minister Shri Nitin Gadkari on September 30, 2019. The completion of this section is expected to further assist in decongesting the Capital Region. National, reducing pollution levels and significantly reducing travel time.

The integrated bus ports of Cuttack (Odisha) and Baddi (Himachal Pradesh) have been approved and the DPOs are in progress.

National Electronic Toll Collection (NETC) program

The Ministry of Road Transport and Highways has launched the national electronic toll collection program (NETC), which provides for the collection of user fees through FASTags based on RFID technology. In order to save fuel, time and pollution and to ensure the continuous movement of traffic, it was decided to allow all the lanes in Fee Plazas for the electronic toll collection program through FASTags. Charging systems will be improved to create a continuous digital charging experience for all road users.

The video letter of the Ministry of November 29, 2019 began the process of declaring "FASTag lane of Fee Plaza" for the entire route to be completed w.e.f. December 15, 2019. However, given the NHAI's request and that citizens are bothered by this condition, it was facilitated for the next 30 days. It is therefore decided that, depending on the accumulation of traffic in the high-volume tariff markets, no more than 25% of the 'FAST Plaza FASTag' may be temporarily converted into a hybrid route by the RO concerned. It should also be ensured that the smallest possible number is converted to a hybrid range and that at least 75% of the intervals in each tariff square remain declared and functional as "FASTag at Fee Plaza" to encourage vehicles that carries FASTag. A total of 1.11.70.811 FASTag was issued until 26.12.2019.

Discouraging the use of 'Single-Use Plastic'

This ministry instructed all offices / officers / employees to discontinue the use of "Disposable Plastic" at the office premises and also to use environmentally friendly products such as Kulhads, clay cups / plates, etc. instead of harmful plastic products.

Road Safety

State Support Programme

It is proposed to launch a state support program in order to encourage states to improve their road safety performance in order to reduce the total number of road accident deaths by 25% by 2024. To accurately record the details of the accident corrective action must be taken in due course. The geo-marked accident data collection program will be launched as part of the "Integrated Road Accident Database (IRAD)" project. IT-based road safety infrastructure would be built on all four-lane highways and above. Incident management systems must also be provided on all these motorways.

The Motor Vehicles (Amendment) Act, 2019

The Motor Vehicles Act of 1988 is the main instrument by which road transport is regulated in the country. It was amended for the first time in 30 years by the 2019 Law on Vehicle Modification, approved by the Parliament and published in Gazeta Indiei on August 9, 2019.

The law will bring reforms in the field of traffic safety, citizen facilitation, transparency and corruption reduction through information technology and the elimination of intermediaries. The law will strengthen public transport, protect and safeguard the Samaritan property and reform the insurance and compensation regime. This will allow innovation and new technologies, such as driverless vehicles, to be tested in a real environment and increase research efficiency. The law will facilitate Divyang, allowing the transformation of vehicles into adapted vehicles with post-facto approval and facilitating the license to drive adapted vehicles. The provisions on compensation and post-accident treatment have been amended and measures will be taken to provide cash-free treatment to accident victims.

Road Safety Provisions and Penalties

- Facilitates electronic monitoring of vehicles for the application of traffic rules. Providing an updated training course to obtain DL after its suspension or revocation for certain offenses such as speeding, drunk driving, etc.
- Penalties were introduced for new offenses and increased for existing ones. For crimes committed by minors worth Rs. 25,000 and imprisonment for up to 3 years for the owner / guardian.
- Digital intermediaries and aggregators (Ola and Uber) will follow the guidelines prescribed by the center.
- Constitution of the National Council for Road Safety to provide advice on road safety and traffic management.

Citizen facilitation, Transparency and Reduction in Corruption

All forms, fees and documents required by law can be sent online to avoid human intervention. Dealer point registration - for the registration of new vehicles, the task of the registration application was transferred to the dealers and the requirement to produce vehicles before the authorization was removed. Formulation of national registers for DL and registers to bring transparency. Automatic testing. The validity periods for DL have been extended. DLs can be renewed at any time between 1 year before expiration and up to 1 year after expiration to facilitate out-of-home citizens, visiting abroad, chronic patients, etc.

Employment facilitation

The minimum educational qualification requirement for a driving license has been removed. Scheme for the installation of driving schools with support from the Central.

Transport Sector

The Ministry notified GSR886 (E) of 29 November 2019 to make changes to the forms in the Central Motor Vehicle Rules of 1989 regarding the capture of mobile owners' numbers when using any vehicle registration service. In its examination of the issue of "worsening traffic in Delhi", the Standing Parliamentary Committee MHA, linked to the department, also mentioned that a large number of vehicles in the VAHAN database do not have mobile numbers. In



view of the above, in view of the urgency of issuing the relevant forms in the Central Motor Vehicle Rules of 1989, which relate to motor vehicle service, ie registration, transfer, motor vehicle registration, renewal, duplicate, NOC grant, change of address, entry or termination of entry for rent / purchase / mortgage are proposed to be amended to include capturing the landlord's mobile phone number at the time of registration for available services.

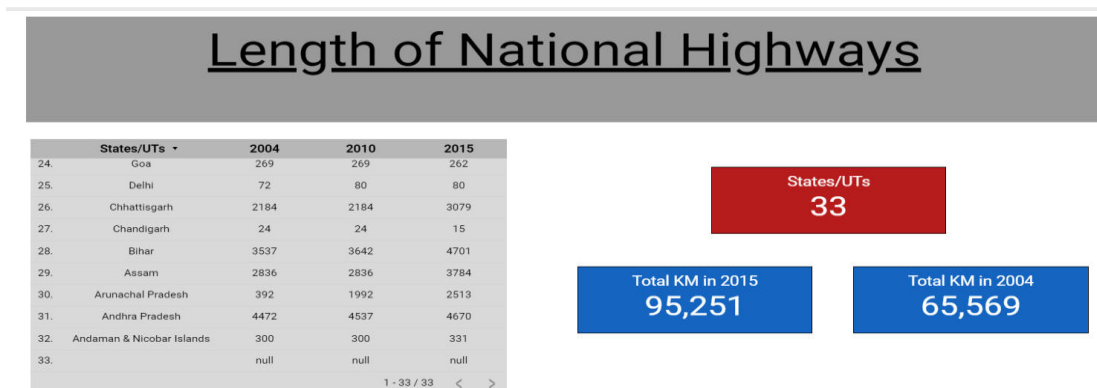
In order to ensure the ease of doing business in RTOs, it is proposed that from 2020 online learning licenses be issued, vehicle registration be done on the same day and license transfer and registration be possible on request.

The Ministry issued opinion number GSR 784 (E) of 12 November 2008, where it was mandatory for all commercial vehicles manufactured after April 2009 to have retro-reflective tape applied. This is in accordance with rule 104 of the CMVR. The Government pointed out that most older vehicles, taking advantage of this notification, obtain exemptions during the annual assembly test. In this regard, this ministry, see GSR 80 (E) of 23 October 2019, established the fixing of the retroreflective strip on all vehicles, regardless of the date of manufacture and also notified its specifications. This is expected to improve traffic safety.

Data on “Road Accidents in India 2018”

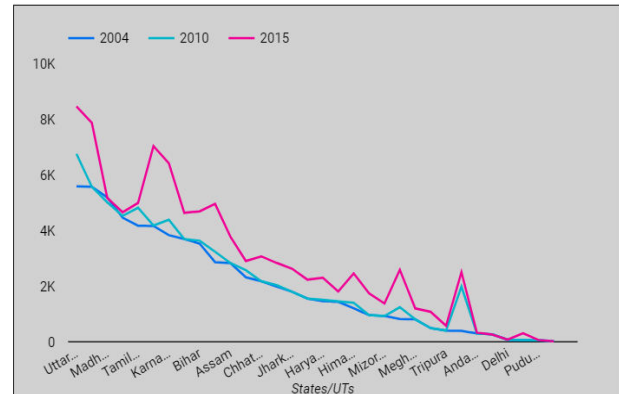
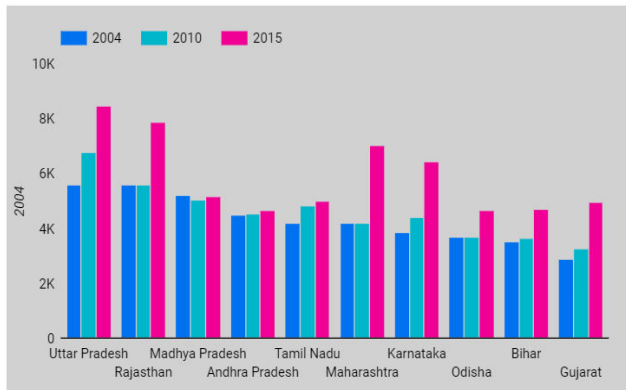
The Ministry of Road Transport and Highways has launched its annual publication on ‘Road Accidents in India, 2018’. Provides data on deaths and injuries resulting from accidents, annual calendar, based on information provided by the State Police Department and UT. According to the Report, road accidents in the country increased marginally by 0.46% in 2018, the year registering 4.67,044 road accidents compared to 4.64,910 in 2017. Deaths in the same period also increased by about 2.37% and 1, 51,471 people were killed in 2018 against 1,447,913 in 2017. However, injuries from road accidents decreased by 0.33% in 2018 compared to 2017.

There are some Graphical visualization created on Google Data Studio.



Scorecard - Showing Total no. States and UTs. The kilometers are increasing From 2004 to 2015.

States/UTs	2004	2006	2008	2010	2012	2014	2015
1. West Bengal	2325	2377	2524	2578	2681	2908	2910
2. Uttarakhand	1991	1991	1991	2042	2042	2282	2842
3. Uttar Pradesh	5599	5874	5874	6774	7818	7986	8483
4. Tripura	400	400	400	400	400	509	577
5. Tamil Nadu	4183	4462	4462	4832	4943	4975	5006
6. Sikkim	62	62	62	62	149	149	309
7. Rajasthan	5585	5585	5585	5585	7130	7646	7886
8. Punjab	1557	1557	1557	1557	1557	1699	2239
9. Puducherry	53	53	53	53	53	53	64
10. Odisha	3704	3704	3704	3704	3704	4550	4645
11. Nagaland	494	494	494	494	494	741	1080
12. Mizoram	927	927	927	927	1027	1222	1381



Column chart and Line chart are showing the The results of Increasing Highways.

	States/UTs	2004	2007	2010	2013	2015
1.	Uttar Pradesh	5,599	5,874	6,774	7,818	8,483
2.	Rajasthan	5,585	5,585	5,585	7,180	7,886
3.	Madhya Pradesh	5,200	4,670	5,027	5,116	5,184
4.	Andhra Pradesh	4,472	4,472	4,537	5,022	4,670
5.	Tamil Nadu	4,183	4,462	4,832	4,943	5,006
6.	Maharashtra	4,176	4,176	4,191	4,498	7,048
7.	Karnataka	3,843	3,843	4,396	4,642	6,432
8.	Odisha	3,704	3,704	3,704	4,416	4,645
9.	Bihar	3,537	3,642	3,642	4,168	4,701
10.	Gujarat	2,871	3,245	3,245	3,828	4,971
11.	Assam	2,836	2,836	2,836	2,940	3,784
12.	West Bengal	2,325	2,377	2,578	2,681	2,910
13.	Chhattisgarh	2,184	2,184	2,184	2,289	3,079
14.	Uttarakhand	1,991	1,991	2,042	2,042	2,842
15.	Jharkhand	1,805	1,805	1,805	2,374	2,632

Tables and Heat map is the increment of national highways With data visualization.

IV. CONCLUSION

literature review indicated that rural roads are how much imported for economy of any country. Education, health and job are other important factor which affected by rural road. Comptroller and auditor General of India observed deficiencies in physical and financial planning, fund utilization, implementation, tendering process, quality assurance, and maintenance of these roads. Improvement of rural road is needed for getting best output. Developing countries has not always sufficient budget to improve rural road, so a methodology is also needed for prioritization of rural road network.

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Impact Factor:
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