Economic Implications of India's Transportation Policies

Abstract

This paper presents an in-depth economic analysis of India's transportation policies, focusing on their financial implications, challenges, and policy recommendations as an area of improvement. The transportation and logistics sector is of cardinal importance in the making of Viksit Bharat by 2047. Still, it is hindered by issues such as inadequate financing, poor governance, high social costs, regulatory challenges, etc. By evaluating the transportation policies in India, their economic implications, both positive and negative, such as a boost to trade and commerce, greater investments, fiscal burden, and Environmental impacts have been discussed. The paper concludes with strategic policy recommendations aimed at promoting sustainable development, enhancing infrastructure, and integrating technology to improve the efficiency of the transportation sector in India. These recommendations aim to guide policymakers in developing a more effective and economically sustainable transportation system, thereby contributing to India's overall economic progress.

Introduction

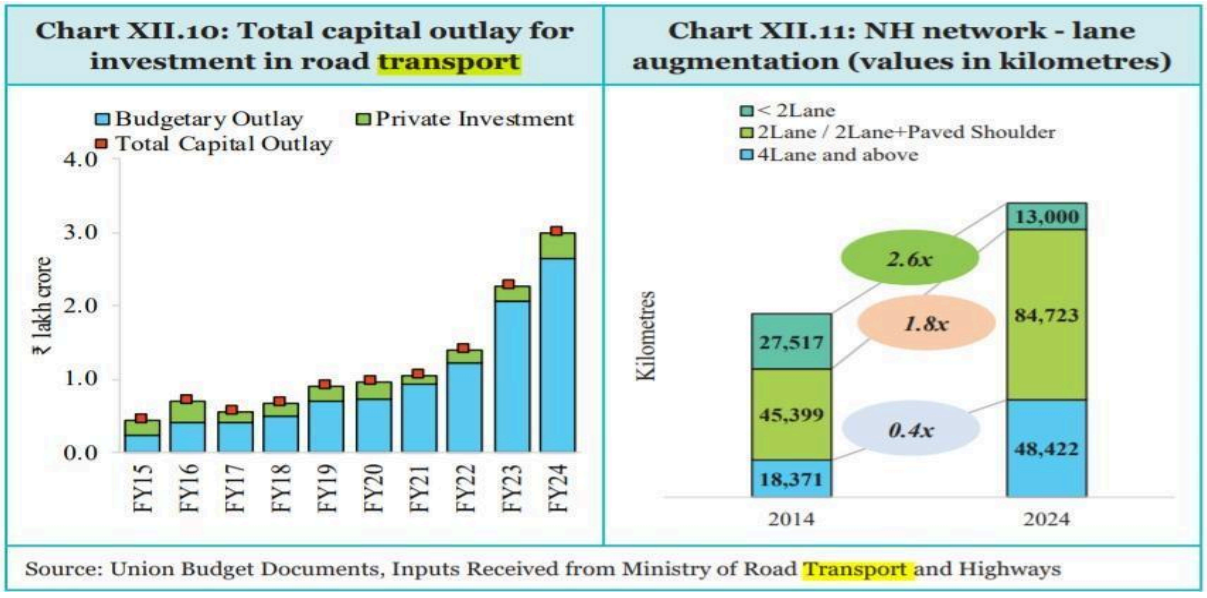
I. Importance of Transportation/Logistics sector in India

At a greater pace the economy grows, the greater the need for a faster, more credible, and more resilient mode of transportation and logistics. The transport and logistics sector is of paramount importance in India’s Economic Development. It helps in the transportation of services and goods across the country, thus determining production costs, and competitiveness of the Indian goods/ services in the global markets. Efficient Logistics can significantly reduce the time and cost involved in transporting goods, thus enhancing access to Markets, and boosting trade volumes and economic integration with the global markets. Investments in transport infrastructure not only improve the efficiency of logistics operations but also stimulate economic activity in the underdeveloped regions of our country. The transport and logistics sector employs millions, including truck drivers, logistics managers, warehouse operators, IT professionals, etc. With the increase in the adoption of technology and automation, there is a growing demand for skilled professionals in this sector. The importance of transportation in sectors like Quick Commerce, manufacturing, and agriculture is of prime importance, where timely delivery is crucial and businesses maintain leaner inventories and respond more quickly to the market demands through a well-functioning logistics/ transport sector. Thus the sector’s growth directly as well as indirectly spurs job creation and support to multiple ancillary industries.

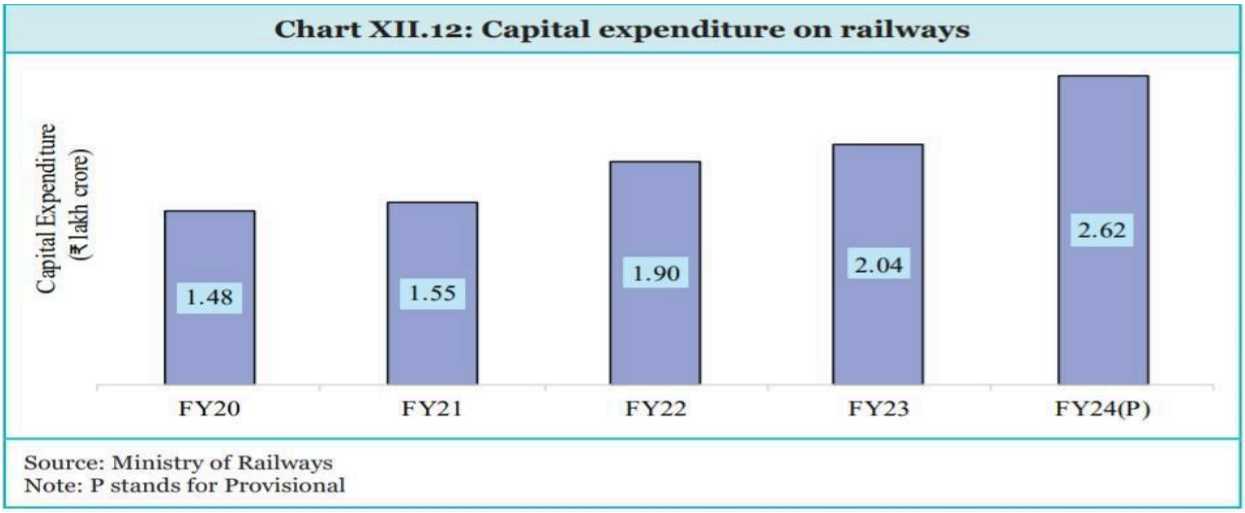
II. Current State of the Transportation Sector in India

The Public Transportation sector in India is expected to propagate with an annual growth rate **(CAGR 2024-2029) of 4.71%**. In addition, India's freight and logistics sector is poised for remarkable growth with an expected CAGR of 8.83 percent catapulting it to USD 484.43 billion by 2029, from current, with a current market size of USD 317.26 billion. Approximately, **14% of India's GDP (Gross Domestic Product) is spent on the Transport and Logistics sector**. If compared, this figure comes to 10-11% for the BRICS countries, 8.7% for the USA, and 8% for Germany, while China spends approximately 14.4% of GDP on Transport and Logistics.

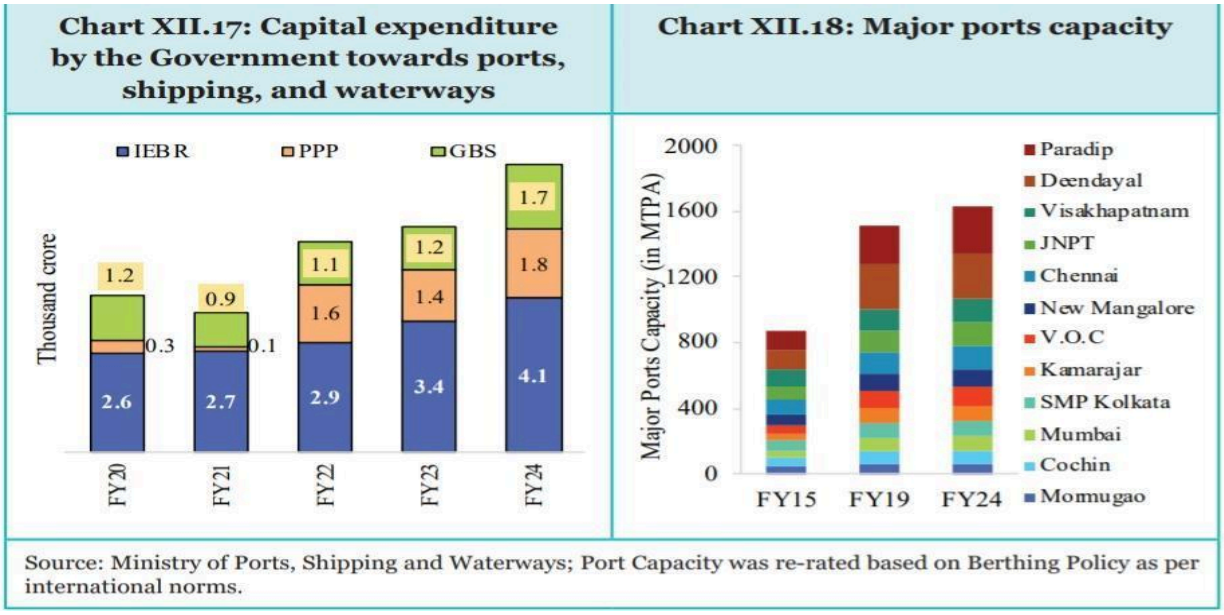
The Ministry of Road Transport and Highways budgetary allocation in the **Union Budget 2024 is around 2.78 Lakh crore for 2024-25,** up from 2.7 lakh crore a year back. The **Ministry of Railways has been allotted 2.55 lakh** crore, up from 2.41 lakh in 2023-2024. For the **Ministry of Ports, shipping, and Waterways,** an amount of Rupees **2.3 thousand crores** has been sanctioned (2024-2025) up from 2.21 thousand crores (2023-2024). While, the **Ministry of Civil Aviation** has been allocated rupees **2.35 thousand crores** (2024-2025), form 3.13 thousand crores(2023-2024)



The Image on left: Total capital Outlay for investment in Road Transportation
The Image on Right: National Highway network lane comparison (2014 vs 2024)



The Above Image depicts the YoY comparison of capital expenditure on Railways (2020 - 2024)



The Image on Left: Capital expenditure by the govt. On ports, waterways, and shipping (YoY Comparison)
The Image on Right: Capacity of Major Indian Ports (YoY Comparison)

Chart XI.13: Growth in air cargo traffic

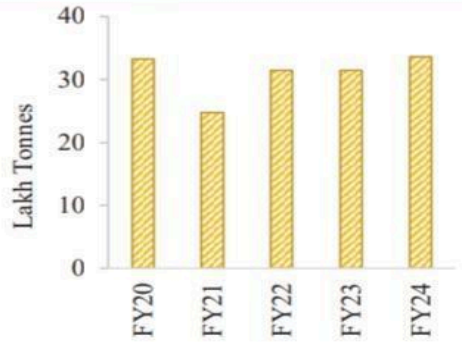
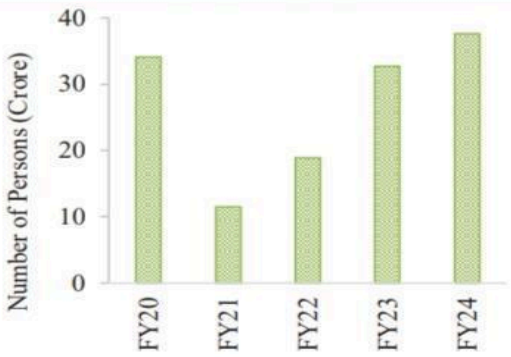


Chart XI.14: Accelerating growth in air passengers handled



Source: Ministry of Civil Aviation

Transportation Policies in India

I. Road Transport

A) Pradhan Mantri Gram Sadak Yojana

This scheme **aims to provide connectivity to unconnected habitations of designated population size** (500+ in plain areas, 250+ in North eastern states, Himalayan states, deserts, and tribal areas as per the 2001 census). A total of 8.2 Lakhs km of road lengths has been sanctioned, out of which 7.6 lakhs Km of road length has been completed as of 18th June 2024. This scheme has been implemented in three phases.

B) Development of Industrial Corridors

Under this scheme, the **Government is developing 11 industrial corridor projects in a phased manner.** These include corridors connecting Delhi- Mumbai, Chennai-Bengaluru, Amritsar- Kolkata, Odisha Economic Corridor, etc.

C) Parvatmala Pariyojana

Parvatmala Pariyojana aims to improve connectivity in hilly regions like Uttarakhand, Manipur, Himachal Pradesh, Jammu Kashmir, etc. to boost last-mile religious and tourist connectivity. **Six Ropeway projects have been awarded** and bids have been received for another two projects.

D) Contractual Maintenance for National Highways

A proactive policy for the maintenance of NH has been adopted under which a contractual maintenance agency is responsible for each Km of the entire NH network. About 37.5 thousand Km of NH network has been undertaken.

E) Toll Digitisation and Sustainable New Age Construction

Automatic number plate Recognition / Global Navigation satellite system has been initiated. During 2014-24, Toll Digitisation reduced waiting time at Toll Plazas from 734 seconds to 47 seconds. In addition, with the new age construction techniques, 13.79 lakh tonnes of inert material from landfill sites have been Reused in the Urban Extension road-II and parts of the Delhi- Mumbai expressway construction.

II. Rail Transport

A) Amrit Bharat Station Scheme

Launched in August 2023, this scheme **aims for the development and upgradation of stations** continuously through the preparation of master plans and its phased implementation. So far, 1,324 stations have been identified for upgradation.

B) MAHSR Project

This project aims for the **construction of a High-speed Rail between Mumbai and Ahmedabad.** This project is executed with the cooperation of the Govt. of Japan and so far the physical progress of 41.7 percent has been achieved.

C) Dedicated Freight Corridors

Under this scheme, Two DFCs, namely the eastern DFC (1,337 Km) and the western DFC (1,506) are to be constructed. As per the Economic Survey, 2024, by the end of FY24, 96.1 percent of the route length would be completed.

D) GatiShakti Multi-Modal Cargo Terminal

This policy aims to accelerate the growth of railway cargo traffic, through the proliferation of new cargo terminals and improve the existing ones. So far, 77 GCTs have been commissioned and approval has been issued for another 186 locations.

E) Electrification Programme

Under the mission, **100% electrification program**, 63.4 thousand Km of IR has been extended under the Electrified Network.

F) Privatizing Indian Railways

In 2020, the Indian Railways initiated the process to allow private firms to operate passenger trains on its network through 151 new trains. Though the Minister of Railways, categorically stated in the Parliament that "there is no scope or discussion of Privatisation of the Railways, the privatization of Indian railways has been recommended for many decades, by the erstwhile Planning Commission of India and now by Niti Aayog.

III. Water, Coastal, IWT Transport

A) Major Ports Authorities Act, 2021

Under this act, a focus has been given to decentralized decision-making, PPP, etc. for enhanced efficiency, functioning, and governance of Major Ports. The legislation empowers these ports to perform with greater efficiency on account of increased autonomy in decision-making and by modernizing their institutional framework. **Besides this, the introduction of web-based e-forms, direct port delivery, container scanners, radio frequency identification-based systems for gate automation, and single window interfaces for facilitating trade are some of the initiatives of the government towards Port modernization, mechanization, and digitalization.**

B) Harit Sagar

Harit Sagar Guidelines 2023, provide a framework for the major ports for drawing out a comprehensive Action plan for achieving targeted outcomes in terms of **reduction of Carbon Emission** over defined timelines. These Guidelines cover aspects of the National Green Hydrogen Mission about ports, the development of Green Hydrogen Facilities, LNG Bunkering, Offshore Wind Energy, etc. Under these guidelines four major ports have been covered - Deendayal Port, New Mangalore Port, VOC Port, and Visakhapatnam Port.

C) Sagar Aankalan

Released in 2024, this is a national benchmarking performance of Indian ports, which applies to all Indian Seaports. **The Sagar Aankalan accesses the logistics performance of Indian ports** through operational performance-based inter-port

comparison. An annual assessment will be done for All Indian Ports (major & non-major). Factors such as Customer Satisfaction, Cargo Handled, Idle time at Birth as a Percentage of Total Time, Share of Renewable Energy, etc. are taken into consideration.

D) Island Development

Under the Maritime India Vision 2030, Andaman and Nicobar Islands and Lakshawadeep are planned to be developed over the next decade around the themes of Eco-tourism, ship repair, seaplane building, free trade terminals, bunkering terminals, etc.

E) Sagar Mala Project

With the Vision of reducing the logistics costs of EX-IM and domestic trade with minimal infrastructure investment. The Sagarmala Programme was approved by the Union Cabinet in 2015 which aims at holistic port infrastructure development along the 7,516-km long coastline through modernization, mechanization, and computerization. In 2021, the Prime Minister launched the Sagarmala – Sagartat Samridhi Yojana, which includes the key initiatives of Coastal Infra Development, Coastal Tourism, and Community and Industrial Development.

IV. Civil Aviation

A) International Aviation Hub Strategy

Under this strategy, the Indian government is working on the enhancement of India's Airport infrastructure to rival the world's premier Aviation hubs. This initiative aims to divert more international traffic towards Indian airports and upscale operational efficiency.

B) Aircraft Leasing

India is promoting the leasing of aircraft through the International Financial Services center (IFSC) at Gift City. More than 28 Aircraft lessors have registered with the Government, which have together leased more than 20 aircraft and 49 aircraft engines, which thus helps in the reduction of upfront Costs of purchasing.

C) UDAAN Scheme (Ude Desh Ka Aam Nagrik)

Udaan Scheme aims to connect small and medium cities with the big cities through Air service. UDAN Scheme, the fare for 500 km air travel has been fixed at Rs 2500 only.

That is, about Rs 5 per km, which is less than the taxi travel cost. Recently, the Government has been working on an expanded and upgraded version of the UDAAN, 2017, in which the government has revealed plans to operationalize twelve new airports across eight states and union territories this year (2024).

V. Other Transportation/ Logistics Policies

A) National Urban Transport Policy, 2020

This policy aims at **improving Integrated urban transport planning**, through Comprehensive Mobility Plans (CMPs) and Transit-Oriented Development (TOD). It also focuses on the enhancement of public transport through the expansion Mass Rapid Transit system (MRTS) and the establishment of Unified Metropolitan Transport Authorities (UMTAs). The policy also aims for the promotion of Sustainable and green transport and Non – Motorized Transport.

B) National Policy on Biofuels, 2018

This policy is an updated version of the National Policy on Biofuels, 2009. It aims to **blend 20% ethanol in petrol and 5% biofuel in diesel by 2030.**

C) National E-Mobility Programme, 2018

This program focuses on the long-term growth of the EV Industry, by **subsidizing vehicle manufacturers, fleet operators, and charging infrastructure providers.** This policy aims to make EVs more cost-effective and attractive

D) Green Urban Mobility Scheme, 2017

This scheme is an initiative to meet the targets of reducing greenhouse gas emissions in India. This scheme promotes hybrid/ electric vehicles and alternate options for fuels for public transport. In addition, the scheme focuses on the Non-motorized Transportation system, Bus Rapid Transport System (BRTS), and Intelligent Transport System (ITS).

Economic Implications of the Transportation Policies

A well-coordinated transportation policy can lead to substantial economic growth, while inefficiencies can hinder progress. India's transportation policies play a crucial role in achieving the priorities of the Viksit Bharat, whether that be "Employment and Skilling", " Urban Development", or "

Manufacturing & Services". These policies impact the efficiency of goods movement, ease of doing business, cost of logistics, accessibility of markets, and whatnot. Following are its economic implications, highlighting both, positive and negative aspects.

I. Positive Implications

A) Boosting Trade and Commerce

Efficient Transport policies **promote businesses and trade by reducing the time and cost associated with the transportation of goods.** Policies promoting the development of highways, dedicated freight corridors,and ports **facilitate smoother and faster transportation.** The improved efficiency of transport infrastructure contributed to India's total trade (exports + imports) growing from $468 billion in 2005 to $1.45 trillion in 2023. In turn, such initiatives increase the competitiveness of Indian goods in the global markets.

B) Economic Connectivity

Improved transportation networks lead to greater economic integration and connectivity among different regions of India. Policies, such as Bharatmala Pariyojana, stimulate regional economies, encourage investment, and create job opportunities. It also helps in the reduction of commodity wastes, such as agricultural produce, thus impacting farmers' income in a significant way. **The UDAAN scheme, launched in 2017, has added 425 new air routes connecting smaller cities. Increased air connectivity has resulted in a 10-15% growth in regional trade**

C) Urban Mobility

Policies aimed at improving urban transportation such as the **National Urban Transport Policy, 2020, and Smart Cities Mission** contribute to an efficient public transportation system and thus increase productivity. Such policies reduce travel time, increase average speed while traveling, alleviate traffic congestion, and improve air quality, thereby boosting overall economic output. By 2024, PMGSY had constructed over 7.5 lakh km of roads, connecting over 178,000 habitations. Improved rural connectivity has boosted agricultural trade by reducing transportation costs by 25-30%, and increased market access for rural producers, leading to an estimated 8-10% rise in rural incomes.

D) Investment Attraction

A robust transportation infrastructure attracts foreign as well as domestic investments. Investors/Businesses seek regions with reliable logistics networks to ensure smooth operations. The implementation of such policies is making India an **attractive**

destination for manufacturing and distribution centers, thus contributing to job creation and economic growth. Since its inception in 2015, the Sagarmala project has seen over INR 6.5 lakh crore ($85 billion) in investments from both public and private sectors for port modernization, development of new ports, and connectivity enhancement projects.

II. Negative Implications

A) Environmental Costs

In Madurai, Environmentalists are expressing concern over the removal of around 30 old native trees for the construction of the Goripalayam flyover and Apollo junction grade separator project. The development of transport infrastructure has significant environmental impacts. **Changing of topography in the hilly areas, reduction of green cover, inadequate relocation policies, and higher vehicle usage** due to expanded road networks contribute towards climate change, health-associated risks, air pollution, biodiversity challenges, etc.

B) Displacement Costs

According to a 2011 study by the Social Science Open Access Repository, around 50 million people have been displaced in India due to 'Development Projects' in over 50 years. Of these, the Adivasi communities constituting about 40% are the worst affected. **Large-scale infrastructure projects often require land acquisition, leading to the displacement of communities**. Inadequate compensation and resettlement measures usually result in social unrest and economic hardship for displaced populations

C) Fiscal Burden

Massive investments in transportation infrastructure require **substantial financial resources.** If not managed prudently, this can lead to fiscal strain and increased public debt. Policies must ensure efficient allocation and utilization of funds to avoid wastage and cost overruns

D) Regional Disparities

While improved transportation can boost regional economies, there is a risk of exacerbating regional disparities. **Well-connected regions may attract more investment and grow faster, while remote areas lag.** For example, Manipur, Sikkim, Nagaland, other Northeastern states, Northern Kashmir, Vidarbha, Saurashtra, etc.

Challenges in the Transportation/ Logistics sector in India

I. Road Transportation

A) Energy Use and CO2 Emissions

Road Transportation makes up **92% of all transport-related energy demand** and 94% of transport-related **CO2 emissions.** Road transport is the largest oil-consuming sector in India, accounting for 44% of final consumption in 2021. **Since 2000, both energy demand and CO2 emissions from road transport have tripled.** In 2021, trucks accounted for 38%, cars 25%, while two and three-wheelers accounted for 20% of the Carbon emissions from Road transport. Overall Road transportation accounted for 12% of national CO2 emissions from fossil fuel combustion.

B) Air Pollution and Health Impacts

While Geographical/ Meteorological factors significantly determine the level of pollution, anthropogenic factors, primarily Road Transport are a major cause as well. Vehicles are a significant contributor to Nitrogen oxide and particulate matter pollution, and this phenomenon is high in urban areas. **A recent study found that in Bangalore transport accounted for 40% of PM 2.5 pollution, while soil dust, partially suspended by vehicles, accounts for another 25%. In Delhi, vehicular contribution to PM2.5 was estimated at around 20-25%.**

C) Economic and Socio-Economic Impacts

With the growth in transport activity and fuel consumption, India's dependence on crude oil imports has only increased. **India imports around 87.7% of crude oil to meet its energy needs. In 2023-24, the crude oil import bill stood at 121.6 billion from 62 billion USD in 2020, making India the third largest oil importing country.** Additionally, the increased vehicular emissions contribute to severe air pollution, with India being home to 14 of the world's 20 most polluted cities. This pollution is responsible for over 1.7 million premature deaths annually, according to the Lancet. The economic cost of air pollution is estimated at 8.5% of India's GDP or approximately $150 billion per year.

D) Poor Inter-Agency Coordination

In Delhi, **agencies like Municipality, DDA, and PWD, on multiple occasions have not been able to figure out properly which roads will fall under their area of work**, because of which responsibility does not fall upon anyone, and crucial works like repair, construction, maintenance of the road, for example, Potholes gets no

attention. In 2017, in Vasant Kunj, Delhi, it took more than three years for the residents to figure out who was responsible for the maintenance of the master plan road in that area.

This problem amplifies in other states, with different governments in power at the center and local level, giving rise to problems in the distribution of Funds, delay in release of funds, and confusion over jurisdiction.

E) High Road Accidents and Poor Urban Planning

Instances where putting up a sewer line and fiber cable after a road is constructed are not uncommon in India. In addition, **the Sewer/ Drainage system constructed in Cities and other places isn't that efficient and Operative, giving rise to the problem of water logging after a few hours of rain**. Coming to the instances of road accidents, there are primarily three factors for it, 1) Human Error (70% cases), 2) Road Condition and Environment, and 3) Vehicular Condition.

F) Challenges in EV financing

There are several key challenges in the financing of EVs in India, such as the resale value of the battery being unestablished at the end of life, also the value of the EV vehicle without a battery is unknown, due to which secondary markets for the EV industry are not well established. Also, **Consumers are uncertain about the quantum of savings or net higher income they stand to earn from owning and operating EVs, while higher down payment and EMI is a certainty**. In addition, the battery of the EV needs to be replaced after 4-5 years of running, given batteries make up 40-60% of the vehicle, which adds significantly to the capex burden of the buyer.

G) Fuel and Vehicle Technology

Currently, the energy mix in India is 74% non-renewable and 26% renewable sources. Therefore, electricity generated under this energy mix leads to a significant increase in vehicular emissions. In addition, Due to the low supply of biofuels in India, the desirable blending targets of biofuels with petrol and diesel were not achieved.

H) Arrangements in Urban Governance Institutions

As of now, the reliance of the local governments on the higher government levels hinders progress in a significant way. **Urban Local bodies are not empowered enough to operate as an independent body to accumulate funds. If this situation**

persists, Urban Local Bodies cannot expand the infrastructure base, improve the quality of sustainability services to their residents, and provide for the accelerated growth of the Indian economy. Also, this dependency limits ULBs' ability to plan and execute transportation projects independently, leading to delays and inadequate infrastructure development. Thus, hampering the ability to address local transportation needs effectively, leading to congestion, inefficiencies, and poor service delivery, ultimately stifling urban mobility and economic growth.

II. Waterways Transportation

A) Technical Challenges

Adequate navigation infrastructure is absent in this sector. For example, large parts of the Indian waterways have inadequate depth for commercial movement of cargo. **Multiple bridges with low vertical clearance obstruct the passage of bigger inland water transport vessels on waterways such as National Waterways No.3.** In addition, Vessel buildings are highly capital-intensive and face difficulties in obtaining project finance from banks and financial institutions. Also, there is a lack of Night navigation facilities such as DGPS and RIS.

B) Regulatory Challenges

This Sector suffers from fragmented governance where multiple entities like the Inland Waterways Authority of India, state maritime boards, and ports operate under overlapping mandates. **The Indian Ports Act of 1908, and the Indian Vessels Act of 1917, which govern the sector are outdated and limit the adoption of modern practices.** The exclusive jurisdiction of the Central Government is only regarding shipping and navigation on inland waterways declared to be 'national waterways' by an act of Parliament. Utilization/sailing of vessels, in other waterways, is within the ambit of the concurrent list or is in the jurisdiction of the respective state governments. There is a lack of potential multi-modal corridors, detailed mapping of waterways industrial clusters, and feeder routes on waterways. Sometimes, even the government distorts the level playing field, by offering preferential treatment to other modes of transportation like roadways and railways.

C) Financial Challenges

There has been underinvestment in inland water transport sector infrastructure vis-a-vis road and rail. **While considerable emphasis has been laid on the development of road and rail infrastructure in successive policies, the inland**

water transport sector has been neglected. Also, the possibility of private sector participation is not being explored at a large scale. Also, there has been a lack of potential investments in the training of manpower and research and development of Inland waterways.

III. Aviation Transportation

A) High Aviation Turbine Fuel (ATF) Prices

ATF prices have substantially surged since July 23 and have been increasing since then, impacting the civil aviation industry. This **rise in ATF prices is crucial for Airlines as approximately 40% of their operating costs** are attributed to jet fuel prices only.

B) Carbon Emissions

As per the DGCA report, the carbon footprint of Indian Airlines on both domestic and international operations is the 7th highest in the world, with an approximate value of 127 lakh tons. Also, 95% of the emissions arise from aircraft, and the remaining 5% is from airport-related operations. Since most plane engines do not allow using 100% SAFs, many airlines operate their aircraft on SAF blended with conventional fuel.

C) Custom Regulations

As per Customs rules, **security declarations in the form of physical stamped copies** of

digital declarations are required for every shipment that is transported. This process **uses a large amount of paper and substantially increases clearance time** impacting the overall efficiency of this sector.

D) Less Availability of Body planes

India's civil aviation sector does not have an adequate number of wide-body planes. Therefore, traveling to long-haul destinations is not possible. Here, **foreign players like FedEx, UPS, and DHL dominate the Indian air cargo landscape** and smaller companies are unable to compete with established big companies due to a lack of a level playing field.

E) Higher Cargo Tariffs and Custom Duties

The transaction costs of the logistics sector are very high in India which comes to 13% to 14% of the GDP as compared to the developed economies where it ranges between

6-8% of their GDP. **The primary reason for such high costs in India is the unjustified enhancement of Cargo tariffs by Cargo Terminal Operators (CTOs) without consulting the concerned stakeholders.** In addition, Indian air cargo operators have to pay high customs duties on leased aircraft which are registered in India. Further, these cargo companies cannot operate aircraft which are more than 20 years old. But at the same time, foreign air cargo players can operate planes more than 20 years old.

IV. Railways Transportation

A) Punctuality and Speed

Because of the poor infrastructure and maintenance of the Indian Railways management system, **the punctuality of the Indian Railways has always been affected negatively.** In addition, this hurts the revenue of the Railways, because people/businesses with higher disposable income prefer Airways because of the factor of time.

B) Infrastructure Challenges

The biggest infrastructural challenge is heavy congestion on tracks, which need to handle the movement of more trains and wagons, thereby resulting in **manual control and allowance of top scheduled trains, resulting in a long waiting time for the rest.** In addition, there has been a lack of Investment in the digital transformation of the Indian Railways. In addition, the Indian Railway Lines do not support high-speed railways, compared with China in which the average speed of the train is 120-130 Kmph.

C) High Crime Occurrence

There has been a steady increase in the occurrence of major crimes in the Indian Railways year-on-year. Crimes such as murder, rape, dacoity, robbery, theft of passengers belongings have dented the image of the Indian Railways in a significant negative manner.

D) Capacity Creation

Indian Railways with its vast network and coverage has an excellent opportunity to align with the growing logistics industry, however, there has been a lack of transformation of existing or creation of new warehouses. In addition, less focus has been given to cold storage and refrigerator car transformation, because of which the

logistics industry and in turn the entire ecosystem has not been able to realize their full potential.

E) Railway Accidents

Since the start of 2024, 21 Trains have derailed in India. These accidents have not just caused material damage but also loss of lives. Around 50 people have lost their lives, while hundreds have been injured since the start of the year due to train accidents.

Rail Accidents are rare if one considers these statistics: a minuscule 0.03 accidents happened per million Km in both 2021-22 and 2020 - 21. But this number becomes infructuous if we consider the number of casualties. **For example, in June 2023, the worst train accident in about two decades was witnessed in Balasore, where nearly 300 Passengers died.**

Though there are multiple reasons involved in it, human failure is a major reason for accidents in almost all accidents in the recent past.

In addition, the inquiries of the Railway Accidents are delayed by 63%. During 2017 - 2021, 78.88% of the funds allotted for the railway's safety went unutilized.

Of the total route length of approximately 69,000 km, the indigenously-developed automatic train protection system 'Kavach' is at present functional in 1,500 km of train route (in the South Central Railway Zone) only.

F) Understaffing in the Railways

As per an RTI Report, Railways has approximately 3 Lakhs vacancies. If compared over the last years, this amount has doubled. **The Employee shortages cause Accidents, high working hours for local pilots, and the Closing of Ticket Booking counters** in multiple instances.

G) Overcrowding in the AC Coaches

This has been a recent phenomenon where videos have surfaced on Social media showing a crowd of Unreserved passengers getting into the AC Coaches, giving rise to the problem of overcrowding and inefficient services to the AC coach's passengers.

According to a report, 95% of people travel in sleeper and General Coaches, and the remaining 5% in the AC coaches. **In addition, over the past decade, the government**

has focused on increasing the number of AC coaches at a higher rate as compared to non-AC coaches because higher revenue is generated from AC coaches. Out of 12.7 lakh seats, 3 Lakh seats were increased in sleeper coaches, the rest went to AC coaches.

Policy Recommendations

For India, to mitigate the mentioned challenges and to develop a world-class Transportation infrastructure and system, action will be required from both the public sector, such as improving market structure, regulations, etc., and the private sector, such as investment in new avenues and technologies and enhancing their operational capabilities etc. Following is a comprehensive set of policy recommendations for the same.

I. Infrastructural and Equipment Solutions

As of 2023, India's warehousing stock stands at approximately 344 million square feet, which has grown significantly from around 55 million square feet in 2007, indicating more than a sixfold increase over the past 15 years. The warehousing market in India is currently valued at around USD 20 billion. In comparison with other countries, India's warehousing infrastructure still lags. For example, China's warehousing stock is estimated to be over 1 billion square feet, while the USA leads with over 10 billion square feet. Japan and Germany also have more advanced warehousing facilities, with stocks of approximately 500 million and 300 million square feet, respectively. Singapore and the UAE, though smaller in size, have highly efficient and modern warehousing infrastructures. India's current stock of warehousing is insufficient in quantity and quality. High quality of physical infrastructure supports the implementation of lean supply chains and avoids wastage. Therefore, **there should be heavy investments in new warehousing facilities across the country, both by the private industries and the Government.** In addition, the focus should also be there towards ensuring the availability and efficiency of refrigerated transport, storage, and processing facilities for medical and agricultural goods by the concerned government departments and ministries. On a note of caution, the location of the warehouses shall not be given a weak emphasis, these warehouses should have quick, high throughput access to multiple transportation modes and be well located to cover large areas of consumer demand.

Potential measures for building reinforced bridges, improving Existing rail quality, introducing longer trains through distributed motive power, and dedicated freight corridors have to be upscaled by channelizing more investments and network managers'

focus. In addition, focus should also be imparted towards improving rail connectivity between the origin/source of raw material and processing units.

As of now, India has two primary Dedicated Freight Corridors (DFCs) under construction, Western and Eastern Dedicated Freight Corridors. Together, these corridors total around 3,381 kilometers. The Indian government plans to extend the DFC network to around 5,600 kilometers. Drawing comparisons, China has an extensive network of over 20,000 kilometers of DFCs, The U.S. has around 40,000 kilometers of dedicated freight rail lines.

According to an Estimated Requirement, India may require an additional 4,000 to 5,000 kilometers of DFCs to support its growing economy, particularly in high-density industrial corridors and regions with significant logistics demands. **Areas where new DFCs could be preferably constructed include 1) North-Eastern Corridor–Linking Kolkata to the North-Eastern states, 2) Western Coast Corridor–Connecting Gujarat ports to the northern hinterland, 3) Southern Corridor–Connecting Chennai to Bengaluru and further to Mumbai.**

Emphasis should be continued on building Inter-modal Logistics parks, and also it should be ensured that parks have both the space and facilities to allow for manufacturing and warehousing operations to be located on the premises. In addition, such parks should be constructed where the demand for freight transport is well-suited to minimize the cost of modal shifts.

Coming to the investments in the road sector, India's current road network hasn't kept pace with the growth of freight demand. The National Highways, which constitute only 2% of the total road network, are responsible for carrying around 40% of the road traffic, highlighting the strain on these critical routes. In Addition, the Logistics costs in India are estimated to be about 14% of the GDP, which is significantly higher compared to 8-10% in developed countries like the USA and Germany. Therefore the current trend of increasing monetary allocation to construction of transport infrastructure should be continued. For example - Phase IV of PMGSY will be launched to provide all-weather connectivity to 25,000 rural habitations.

Emphasis and Efforts should be channeled towards a shift from Bitumen Asphalt roads to Bitumen Concrete Roads, which have a life span of 100 years, as compared to the lifespan of Bitumen Asphalt roads which are just 10-15 years. In addition, **4-5 inches of white topping concrete** shall be there in water-prone areas to reduce instances of potholes. Also what

is the need of time is the **Special Drainage System,** which shall have the features of **Permeable Pavements, Underground Retention Systems, Green Roofs,** etc. For cases, where contracts are given, a Watchdog agency shall be established at the Centre with its sub-branches, to ensure the accountability of not only Contractors but also Govt. Agencies and departments.

Coming to the reduction of accidents, **Technology should be used in accidents in the black spots, by providing quick and better medical services in those accident-prone areas. For example, Tamil Nadu created a crash Database system,** which helped in mitigating these accidents by providing help to the victims, in timely interventions. In addition, corruption in the RTI offices shall be reduced, which will reduce the inappropriate issuing of the Driving Licence. Also, efforts should be channeled innovatively and creatively towards the **development of Civic sense, through social media, Traditional Marketing, etc. Example - Appealing/ Funny memes circulated by the Traffic Challan Departments.**

Coming to the issue of accidents in the Railways, over the past several years instead of focusing on the renewal of the existing track structure, Railways has been focusing on new projects. Modernization of the existing Indian Railways Tracks is a necessity. Apart from the creation of new routes, new Wagon, and New trains emphasis should be given to laying down more tracks which will help in reducing congestion on the existing tracks, increase average speed, and better management of operations. In addition, the **Renewal of the Existing old structured tracks will help support the high-speed rail capacity of the Modern Trains. Ultrasonic Floor detection should be tested in every Railway zone in India.** In 2023, the Odisha Train Accident, Ultrasonic floor detection in the ECoR region was 0%. Lastly, the Indigenous KAVACH system should be installed at a very rapid rate to have the maximum coverage

Lastly, coming to truck driving, one of the potential infrastructure solutions to urban logistics inefficiency is the Consolidation centers. **Consolidation centers are cross-docking infrastructure that aggregates deliveries going into urban centers and regroups them into consolidated shipments** which allows for greatly enhanced loading and routing efficiency of delivery trucks. However, on a note of caution, they typically meet with resistance from logistics firms because of their high cost and they typically fail after subsidies are withdrawn.

II. Technological and Digital Solutions

There have been several instances in the Indian logistics system of 'stock out' events where products are unavailable for sale to the clients, now to avoid such instances, emphasis should be

given to **supply chain digitization, improving data analysis to turn that data into accurate demand projections,** figuring out direct consumer behavior through data-enabled internet of things (IoT).

Deploying big data in distribution network design, design that minimizes total cost is a complex computational process with significant data demands but is the need of the time for reducing the delivery time and costs for any mode of transportation. Mobilizing rich data sets around demand composition, transport capacity, transport price and the seasonality of all the above allows logistics managers to rapidly simulate huge numbers of network configurations and select one that minimizes cost.

Coming to the issue of safety and reliability in the Indian Railways, A major determinant of network capacity is the blocking and signaling systems used in the rail network. In current analog solutions, a block is a physical section of track that only one train may occupy at a given time and a signal is typically a physical sign or light indicating whether a train may or may not enter a given block**. Digitizing the physical blocking systems through virtual moving block systems can enable maximum network throughput by computing minimum train following distance based on real-time information about train location, speed, and braking distance, thus increasing safety and reliability**

Another policy recommendation would be the incorporation of an Intelligent transportation system in the logistics field. There are multiple technologies under ITS which include Weight-In-Motion (WIM) systems, vehicle location and condition monitoring systems, traffic controlling and monitoring systems, delivery space (for parking) booking systems, route planning systems, location monitoring systems, and freight status monitoring systems. Such policies contribute towards an intelligent transportation system

III. Regulatory Solutions

A broad set of policy and regulatory solutions can improve infrastructure connectivity and capacity, reduce the idle time of trucks, and promote and incentivize digitization and other best practices in the logistics sector. As a result, the Ministry of Commerce & Industry has identified a need to develop an Integrated National Logistics Action Plan to improve transparency and enhance efficiency in logistics operations.

Integrated land planning with designated spots for large-scale multimodal logistics hubs can reduce multiple inefficiencies in the Indian Transportation System. In land use policy,

two main outcomes can support efficient logistics. The first is connectivity—**land should be made available for logistics development at major modal intersections** that are in proximity to significant freight-generating areas, such as cities or industrial clusters. The second is density—**logistics facilities that are clustered with other logistics facilities can create economies of density** that lower transport costs and increase efficiency.

Using zoning policy to reserve suitable land for urban logistics purposes, as discussed above with urban logistics spaces, can help slow or reverse logistics sprawl. Zoning logistics uses into urban cores should be done with care as many logistics uses are unsuitable for urban environments. However, a zoning policy that permits suitable logistics uses on suitable land, for example, urban logistics spaces for parcel delivery, can enhance urban quality of life

IV. EV's Affordable Financing Solutions

Currently, the Electric vehicle industry faces multiple challenges, related to its financing because there are concerns around technology, resale value, etc. because of which financial institutions are not much into financing an EV. To address this there are certain policy recommendations which are as follows:

There should be the **creation of risk-creation facilities like a loan loss reserve** that provides access to low-cost capital and can cover general default or loss due to specific risks. In this, there will be multiple stakeholders involved like the government, financial institutions, Multilateral development banks, etc.

Secondly, emphasis should be given to the **promotion of Green bonds and asset-backed securities that have emerged as an innovative financial instrument** in the last decade to mobilize a significant amount of nascent institutional capital, distribute risk over a larger base through asset-backed securities, and bring down the cost of capital. However, additional government and regulatory support is required for the proliferation of green bonds as a financing instrument in India. In this, MDBs can play a significant role.

Another issue that the EV industry is facing is the increase of the Down payment and EMIs for the shorter tenure loans in comparison with the ICE vehicles. This issue can be solved through multiple ways like **the facilitation of the decoupling of the battery from the vehicle which allows the financiers to factor risks for the vehicle and battery separately, This will reduce the loan amount on the vehicle thus reducing down payments and EMIs.** In

addition, the EMI burden can be further reduced through subvention schemes and tax exemptions by the Government.

At a macro level, the government should promote the creation of secondary markets for EVs in India which is at a very nascent stage.

V. Aviation Industry Solutions

Concerning challenges and issues prevalent in the India Aviation industry, there are certain policy recommendations which are as follows

Firstly, **India should focus on the creation of Multimodal and Dedicated Transhipment Hubs** that will help Indian airlines and freight forwarders ship more cargo tonnage across the world and will help them to work at a greater potential thus contributing towards more connectivity and cost-effectiveness.

Secondly, Indian aviation should focus on moving towards Sustainability. Rules requiring paper-based security declarations should be digitized. In addition, the **adoption of sugarcane molasses-based biofuel will not only cut emissions but also benefit farmers** and will create more green jobs.

Thirdly, be it the Cargo tariff by the Cargo terminal operators or freight charges (security surcharge, fuel surcharge, etc.) should be rationalized because they simply add to the logistics cost and transaction cost.

Fourthly, the Government should strengthen the air cargo logistics infrastructure in the country through the **development of Air freight stations** which have the potential to be the game changer in the Indian Logistics Industry. Though policy guidelines have been released in 2014 only, they have not been implemented.

Conclusion

India's transportation and logistics sector has and will play a crucial role in India's economic progress. Be it from reducing the cost of logistics, and time of delivery to the creation of new jobs, creation of new avenues of income, the transportation sector is going to impact the business as well as the common people, in turn, all types of people. It cannot be denied that there are several impediments in this sector, but adequate focus through better policies, adequate research, integration of data and

technology, adequate financing, and most importantly the positive will of the government institutions and authorities will transform the Indian Infrastructure/ transport and logistics sector to world-class facilities.

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