

**Exploring an ideal sustainable PPP model for Indian Railways (IR)
infrastructure**

Thesis submitted to the

UPES

For the Award of

Doctor of Philosophy

in

Management

By

Sanjeev Sharma

December, 2024

Supervisor

Dr. Saurabh Tiwari

External Supervisor

Dr. Vinay Kandpal



School of Business

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Dehradun-248007: Uttarakhand

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DECLARATION

I, Sanjeev Sharma, declare that the thesis entitled ‘Exploring an ideal sustainable PPP model for Indian Railways (IR) infrastructure’ has been prepared by me under the guidance of Dr. Saurabh Tiwari, Sr. Associate Professor, School of Business, UPES (Internal Supervisor) and Dr. Vinay Kandpal, Professor, Graphic Era University (External Supervisor). No part of this thesis has formed the basis for the award of any degree or fellowship previously.



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CERTIFICATE

I certify that Mr. Sanjeev Sharma, SAP ID: 500072245 has prepared this thesis entitled '**Exploring an ideal sustainable PPP model for Indian Railways (IR) infrastructure**' for the award of the degree of Doctor of Philosophy of UPES, under my guidance. He has carried out the work at the School of Business, UPES.

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ABSTRACT

The service sector is one of the core sectors in any economy of a country, and Transport is one of the key service sectors of a country. Indian Railways (IR), which was started as a transport system to serve the colonial interest of the British regime, gradually assumed a crucial role in unifying the country with its network and became the main vehicle for its socio-economic development. IR is the most affordable, fastest, safest, and environmentally friendly form of surface transportation available in India, both for commuters and the longer-distance transportation of goods, especially heavy ones. It is the backbone of the nation's public transportation system and is regarded as having superior environmental effects, energy efficiency, land utilisation, and safety as compared to the road transport sector. It is thus necessary for the national interest that IR sustains, grows to meet the demand of the economy, and continues to function efficiently.

However, of late Railways finances and infrastructure investments have landed in a precarious situation and stuck in a vicious cycle. The rising operating expenses, lesser internally generated resources, and high-cost extra-budgetary resources to compensate for dwindling budgetary support for capex requirements from the Central Government have led to lesser investments in the rail infrastructure. This has created a negative effect on IR's operational capacity, timeliness, speed, and safety causing the loss of its remunerative business and the deterioration of its finances even more. The high-density network connecting the metro areas has nearly reached saturation, which has negatively impacted the quality and punctuality of the railway services. The IR network is currently experiencing severe capacity problems. However, the recent tremendous expansion of road infrastructure has posed formidable challenges to IR in the freight transportation business and the growth of low-cost airlines in its passenger transportation business. Thus, to maintain IR's competitiveness in comparison to other transportation modes and continue offering its customers the best possible passenger and freight services, quick action is needed to upgrade and expand IR's infrastructure.

The global challenge of developing railways solely with public resources necessitates greater private-sector involvement. However, public

sector engagement, particularly in the Public Private Partnerships (PPP) infrastructure projects requires the creation of a favourable policy and regulatory eco-system. While PPPs offer additional resources and market orientation, they can also pose significant challenges if not properly structured and administered. The present research work aims to develop a comprehensive framework to help and guide the policy makers in structuring a sustainable PPP model for IR's infrastructure projects. The study draws on secondary data from Indian Railways' annual reports and statistical statements, as well as primary data collected through surveys and semi-structured group discussions with stakeholders involved in the infrastructure projects of Indian Railways.

The literature review has revealed that integrated infrastructure projects are not feasible in the railways' systems as they involve very large investments, long gestation periods and higher commercial risks due to multiple revenue sources and insufficient fare box revenues to recover the capital investments. LR shows that various unbundling approaches between infrastructure, operations, and services is being tried out to tackle these constraints.

A sustainable PPP would require various elements, including economies of scale, level playing fields between Government and Private investors, transactional transparency, the need for specialization, accountability, and synergy between entities. All these factors need to be fairly assessed and honestly addressed by the government. The majority of public-private partnerships that exist today suffer from improper interface management between the involved parties and face a number of risks. These must be properly recognized and dealt with by means of suitable contractual arrangements and a separate regulatory framework. The Ministry of Railways (MoR) India has envisaged substantial PPPs in infrastructure projects under the National Investment Plan (NIP). A few PPPs have emerged since the implementation of this policy, but the results to date are unsatisfactory and there is a significant disparity between supply and demand.

This research intends to assess the result of PPP policy initiatives taken by IR in 2012 in bringing private investment in railway infrastructure projects, critical analysis of the existing PPP models on IR and the improvement required therein. An analysis of current PPP projects shows that lack of clarity, inappropriate risk allocation, conflicts of interests, absence of an independent regulatory regime, and lack of accountability and performance measures

between entities are the main constraints. These can be cured by addressing these issues in future PPP infrastructure projects.

Keywords: Indian Railways, Railway Infrastructure in India, Infrastructure financing in Railways, PPP in Railways, PPP projects and agreements, Railways PPP agreements/ concessionaires, Constraints, Risk allocation in Railways PPP projects, Regulator in PPP

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Dehradun, Uttarakhand

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(Sanjeev Sharma)

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Chapter 1

Introduction

1.1 General

Indian Railways (IR), very aptly called the lifeline of India, is considered to be the most convenient and reliable mode of transport serving the nation for the past 171 years and has been an integral part of the country's transportation network.

Some notable features of Indian Railways (2022-23) are as follows:

- Extensive rail links of 68584 route kilometres, and 106493 track kilometres,
- Fourth biggest railway network in the world (United States of America 2,50,000 Kilometre, China 1,00,000 Kilometre, Russia 85,500 Kilometre, India 68,600 Kilometre),
- A wide fleet of 14360 locomotives, 66106 coaches, 11664 Electric Multiple Unit (EMU)/ Diesel-Electric Multiple Unit (DEMU)/ Diesel-Hydraulic Multiple Unit (DHMU) cars, 12 Rail Cars, 11139 other coaching vehicles, and 315791 wagons currently operate almost daily,
- Freight carried – 1509.10 Million Tons (MT) per annum; 4.13 MT/Day (4th largest in the world),
- Passenger carried – 8085.74 million (2019-20- pre-Covid), 6395.76 million; 18.07 million/day (largest passenger carrier in the world),
- No. of trains per day - 22929 trains -12541 passenger trains, 10388 freight trains,
- No. of stations – 7364,
- No. of employees – 1.19 million approx.,
- Earnings- INR 2,39,982.56 crore,
- Expenditure-Rev-INR 2,35,655.78 crore; Capex- INR 2,03,983 crore,

Gross Budgetary Support (GBS)-INR 1,59,257 crore (78%); Internal Resources (IR)-INR 3400 crore; Extra Budgetary Resources (EBR)-INR 30239 crore (15%); Public Private Partnership (PPP)-INR 11086 crore (5.4%) (In 2020-21 EBR was 70% INR 107261 crore / total capex INR 155181 crore)

1.2 Traditional way of creating Railway Infrastructure:

Traditionally, investing in infrastructure has been considered a state responsibility. IR's infrastructure projects are no exception and have been

mostly funded from budgetary support given by the Ministry of Finance, as shown in Appendix 1 and summarized below in Table 1.1:

Table 1.1 Financing of Railways' Capex under each Plan Period

(INR in crore)												
Plan	Internal Resources	Borrowings through			Total Internal and Extra-budgetary Resources	Safety Funds (Created in 2001-02)				Capital from the General Exchequer	Total investment	Total Fund from General Exchequer incld. SRSF/RRSK #
		I.R.F.C. (including for RVNL) +EBRIF	BOLT, OYW, WIS & PPP	Total		R.S.F.	S.R.S.F.		Total			
	Amt.	Amt.	Amt.	Amt.	Amt.	Amt.	Amt. From General Exchequer	Amt. from Safety Surcharge	Amt.	Amt.		Amt.
I	280				280					142	422	142
II	467				467					576	1043	576
III	545				545					1140	1685	1140
IV	397				397					1031	1428	1031
V	384				384					1141	1525	1141
VI	2783				2783					3802	6585	3802
VII	7089	2520		2520	9609					6940	16549	6940
VIII	18832	5565	596	6161	24993					7313	32306	7313
IX	15737	12947	1056	14003	29740	140	1000	434	1574	14411	45725	15411
X	25871	16657	30	16687	42558	1153	9789	3697	14639	26573	83770	36362
XI	66317	46086	892	46978	113295	4326	1165	232	5723	71824	190842	72989
2012-13	9531	15142		15142	24673	1578	..	..	1578	24132	50383	25710
2013-14	9709	15225	..	15225	24934	1983	..	..	1983	27072	53989	29055
2014-15	15347	11044	..	11044	26391	2206	..	..	2206	30121	58718	32327
2015-16	16845	23985	15081	39066	55911	2601	..	..	2601	35008	93520	37608
2016-17	12125	25745	26834	52579	64704	10732	..	..	10732	34500	109935	45232
Total - XII	63557	91141	41915	133056	196613	19100	--	--	19100	150832	366546	169933
2017-18	3070	33382	22116	36452	58568	11375	..	..	11375	32043	101986	43418
2018-19	4663	51595	24281	75876	80539	13000	..	..	13000	39838	133377	52838
2019-20	1686	66292	12609	78901	80587	16886			16886	50592	148064	67477
2020-21	2062	107261	15935	123196	125258	-3			-3	29926	155181	29923
2021-22	1694	60678	10388	71066	72760	11105			11105	106402	190267	117507
2022-23	3400	30239	11086	41325	44725	30001			30001	129256	203983	159257

IRFC: Indian Railway Finance Corporation, EBR: Extra Budgetary Resources, IF: Institutional Finance, OYW: Own Your Wagon Scheme, WIS: wagon Investment Scheme, RSF: Railway Safety Fund, SRSF: Special Railway Safety Fund, RRSK: Rashtriya Rail Sanraksha Fund; Source Indian Railway's Budget Documents

IR was facing enormous challenges in its infrastructure investment till 2014, with a substantial throw-forward of a large number of projects under pipeline with inadequate budget allocations due to lack of financial closure for these works (Appendix 2), resulting in significant time overruns and consequential cost overruns in the said projects. With an increased demand for additional infrastructure on one hand and inadequate internal resources and

declining government budgetary support on the other, IR was forced to take recourse to costly extra-budgetary measures to part-finance its Capex needs. The position of Capex planning on IR can be summarised as under:

- a) Large infrastructure projects, such as line capacity works and connectivity improvements, are executed by the construction wing of the zonal railways themselves. Lately, some of these have been shifted to the Special Purpose Vehicle (SPV) mode, and Railway Public Sector Undertakings, Dedicated Freight Corridor Corporation of India Limited (DFCCIL), Rail Vikas Nigam Limited (RVNL), and India Railway Construction International Limited (IRCON), have been given contracts for constructing and/ or driving them.
- b) Container Corporation of India Limited (CONCOR) and its subsidiaries are handling Inland Container Depots (ICD) and cold chain investment requirements. Although container operations have now been opened to private operators, investment has been below expectations.
- c) Indian Railway Finance Corporation Limited (IRFC) is financing more than 80% of the rolling stock requirement and, lately, also in infrastructure projects under the finance lease model.
- d) Private investment in the rolling stock is also contemplated through various measures viz, Private Container Operators scheme, Own Your Wagon scheme, and private passenger trains scheme.
- e) The Railway Land Development Authority is handling investments in the Station and Land development of Railways.

Having regard to the impact of development in Rail infrastructure on the national economy in the framework of an import-led export growth development model, the Niti Aayog formulated an investment plan of about INR 8.5 Lakh crores in rail infrastructure, which the Government of India approved for 2014-19 (Table 1.2):

Table 1.2- Investment Plan 2014-19

Description of the Projects	Amount (INR/ Crores)
Rail Network Decongestion, including identified Dedicated Freight Corridors, Electrification, Doubling, and Traffic Facilities works	1,99,320
Rail Network Expansion including electrification works	1,93,000

Railway National Projects in North-eastern and Udhampur-Srinagar-Baramulla Rail Link, Kashmir valley connectivity works	39,000
Railway Safety Works comprising Track renewal, Bridge works, Rail Over Bridge, Rail Under Bridge, and Signalling & Telecommunication works	1,27,000
Railway Information Technology and Research works	5,000
Rolling Stock comprising Locomotives, coaches, and wagons including production and maintenance	1,02,000
Railway Passenger Amenities Works	12,500
National High-Speed Rail and Elevated Corridor Works	65,000
Railway Station Development works and logistic parks	1,00,000
Other Railway Works	13,200
TOTAL	8,56,020

Source: IRFC Lecture by Shri Vijay Kumar, IRAS, Ex-Financial Commissioner of Railways on IRIFM Lecture Database (Table 2: Railways Investment Plan:2015-2019)

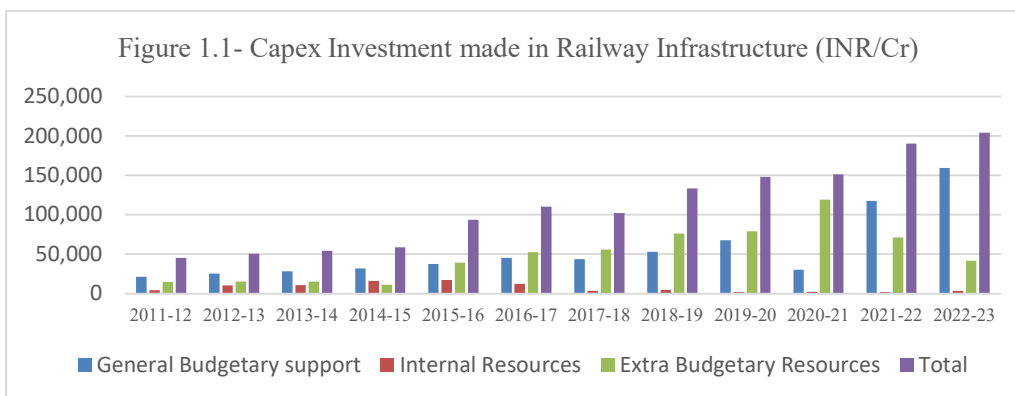
Table 1.3 shows that the Government of India has boosted its capital investment in the railway sector.

Table 1.3-Capex Investment made in Railway Infrastructure

(INR/ crore)

Source	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
General Budgetary support	21,073	25,234	28,174	31,617	37,516	45,232	43,418	52,838	67,477	29,923	1,17,508	1,59,257
Internal Resources	4,198	10,007	10,590	16,057	16,938	12,125	3,070	4,663	1,685	2,062	1,694	3,400
Extra Budgetary Resources	14,790	15,142	15,225	11,044	39,066	52,578	55,498	75,876	78,901	1,19,196	71,065	41,325
Total	45,061	50,383	53,989	58,718	93,520	1,09,935	1,01,986	1,33,377	1,48,064	1,51,181	1,90,267	2,03,983

Source: Dhingra and Sharma (2022) and Indian Railways Year Books 2011-12 to 2022-23, Budget Documents 2011-12 to 2022-23.



The key focus areas of the above investment plan have been the decongestion of the densely utilized railway network, construction of new lines, capacity augmentation by doubling, tripling, and quadrupling the existing rail lines, electrification and improved signalling and telecommunication besides procurement of track machines, locomotives, wagons, coaches, etc.

It is pertinent to mention that from 1950-51 to 2022-23 the freight loading on Indian Railway increased from 73.2 Million Tonne to 1509.10 Million Tonne (registering a 2062% growth) and Passenger Kilometres (PKM) increased from 66.5 Billion Kilometre to 1050.73 Billion Kilometres in 2019-20 (i.e., 1580 % growth) (it dropped to 231.13 Billion PKM in 2020-21 due to impact of COVID) and recovered to 958.92 Billion Kilometre only in 2022-23, but growth in route kilometres was 127% only (Appendix-4). Currently, on the High-Density Network (HDN) routes comprising Delhi-Howrah, Delhi-Mumbai, Mumbai-Howrah, Howrah-Chennai, Mumbai-Chennai, Delhi-Guwahati, and Delhi-Chennai out of 247 railway sections, 161 sections (65%) are operating at 100 percent or above line capacity (Dhingra & Sharma, 2022). The mounting congestion and saturated usage of the current line capacity resulted in reduced headway and consequential increased chances of collisions on these busy stretches. Most of the casualties take place due to derailments caused by defects in the railway track or the rolling stock. It also adversely affects the average speed and quality of service delivery to the passenger and freight customers. As per the National Infrastructure Pipeline report, over 7,000 kilometres (11%) of the railway track length is more than thirty years old and needs immediate track renewal and replacement. While demand has increased, with an Operating Ratio (operating cost/ operating revenue) of over 98%, IR finance is left with a meagre surplus for capital investment. The higher operating ratio and limited government budgetary support have resulted in a substantial investment gap for capacity expansion. Railway infrastructure and modernization plans have suffered badly due to inadequate investments and need immediate action for up-gradation.

However, investment in Rail Infrastructure, the integrator of the national economy, is necessary for the economic growth of the nation. Gross budgetary support also has its constraints to fully meet the IR requirements; IR is now using costly Extra Budgetary Resources for infrastructure expansion, leading to ever-mounting debts. Due to the approaching maturity of the DFC

and HSR rail network payback commitments, the debt-servicing expenses associated with this EBR funding are expected to increase significantly in the future. Railway finances will then be burdened further by high debt payment costs.

Investment in Railway infrastructure only with Government resources is a challenge for authorities across the world. In this context, Public-Private Partnerships (PPPs) have emerged as a viable approach to closing the resource divide and enhancing market orientation (Estache et al., 2011). However, the PPPs are complex arrangements and can have serious complications if not properly designed and managed. The railway infrastructure projects pose more challenges in comparison with the other modes due to the uniqueness of the railway's obligation as a public and affordable mode of transportation, economies of scale and scope, and specific technology base. As a result, some of the railway PPP projects had to be restructured or brought back under the government control, after the private entities failed to operate these projects viz Taiwan High-Speed Railways and Channel Tunnel UK, London Underground (Geest & Núñez-Ferrer, 2011; Chou et al., 2012; Kien-hong & Johannesson, 2012).

1.3 Investment Planning- Need for PPP in IR's infrastructure projects:

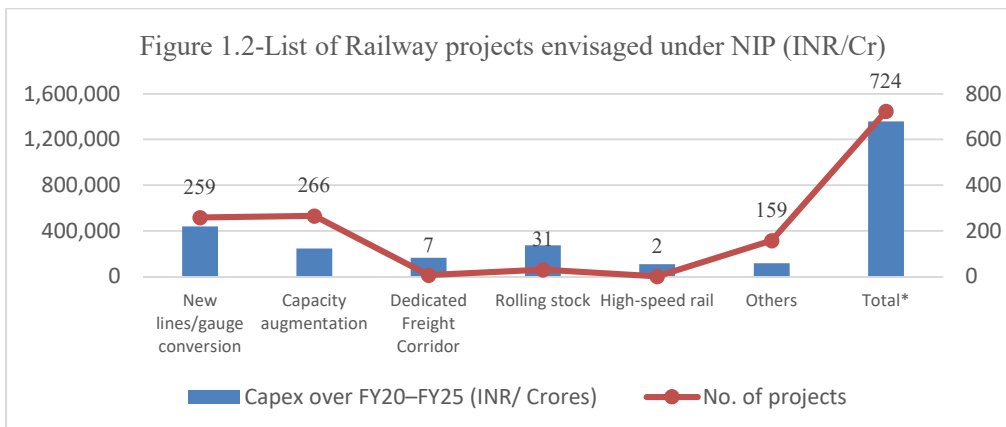
To achieve the government objective of a five trillion-dollar economy in India, the GOI formed a Task Force on National Infrastructure Pipeline (NIP), under the Chairmanship of Secretary Expenditure on general and sector reforms by the Centre and States. The Task Force projected a total investment of INR 111 lakh crore in key infrastructure sectors over five years from financial year 2020 to 2025. NIP inter-alia envisages a total capital expenditure of INR 13,67,563 crore (INR 13,58,820 crore by Centre and INR 8,743 crore by States) in 724 identified projects during the above plan period in Indian Railways infrastructure by the Centre, States and Private sector. Of these 697 projects amounting to INR 11.97 lakh crore will be executed through Engineering Procurement and Construction mode by the Government and 27 projects worth INR 1.61 lakh crore will be executed under the Public-Private Partnership (PPP) route (Dhingra & Sharma, 2022) shown in (Table-1.4):

Table-1.4 List of Railway projects envisaged under NIP

Category	No. of projects	Capex over FY 2020–25 (INR/ Crores)
New lines/gauge conversion	259	4,40,072

Capacity augmentation	266	2,47,985
Dedicated Freight Corridor	7	1,66,171
Rolling stock	31	2,75,539
High-speed rail	2	1,10,647
Others	159	1,18,406
Total*	724	13,58,820

*Includes INR 1.61 lakh crore planned through PPP route



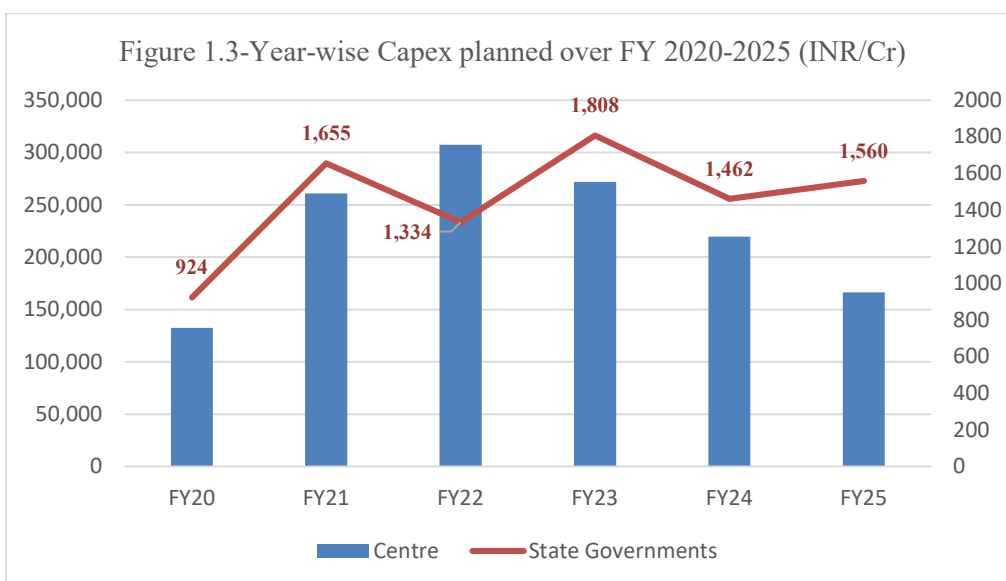
Year-wise Capex expenditure planned over FY 2020 to 2025 is shown in Table 1.5 below:

Table-1.5: Year-wise Capex planned over FY 2020-2025

(INR/ Crores)

Rs in crore	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Total
Central Government	1,32,463	2,60,811	3,07,466	2,72,024	2,19,747	1,66,309	13,58,820
State Governments	924	1,655	1,334	1,808	1,462	1,560	8,743
Total	1,33,387	2,62,465	308,800	2,73,831	2,21,209	1,67,870	13,67,563

Source; NIP Document



Indian Railway is therefore, mandated to develop rail infrastructure using both central and State Government resources as well as private resources through public-private partnerships route for the timely completion of its capacity enhancement works (Dhingra & Sharma, 2022). According to the 2015 report by the Bibek Debroy Committee (2015) on the mobilization of resources for major railway projects and the restructuring of the Ministry of Railways and Railway Board, the private sector can provide the necessary capital and diligent management techniques to implement systemic changes in the railway industry. The afore-mentioned report suggests that given internal production capacity and demand requirements, the private sector should also be involved in the rolling stock purchase process. Prior to this, the (Sam Pitroda Committee, 2012), recommended attracting the private sector to invest in a range of railway infrastructure projects, such as high-speed rail links, elevated rail corridors, private freight terminals, station development, and leasing of locomotives, wagons, and coach manufacturing units, among other projects.

The Ministry of Railways (MoR), India has also planned to take up many infrastructure projects under PPP mode, which include improvement and strengthening of existing lines, expansion of new railway lines, high-speed passenger rail corridors, and modernization of stations, etc. (Ministry of Railways Vision 2020). Although IR has taken up some projects with the private sector as an equity partner, it had no significant prior experience in designing and implementing such large ‘PPP’ projects. With its integrated structure and dominance of MoR, Indian Railway’s policy viewpoint towards PPPs has largely been construed as myopic and has caused disputes and obstructions in ongoing PPP partnerships viz, private container operators, besides adversely affecting awarding projects like development of New Delhi railway station and coach manufacturing units etc under PPP models in the recent past (Raghuram & Gangwar, 2010).

By leveraging technology and innovation, PPPs can create railway systems that are not only modern and efficient but also sustainable and resilient. Digitalization and smart infrastructure enable these projects to address urban mobility challenges, support climate goals, and ensure economic viability, creating long-term value for all stakeholders. Technologies like Automatic Train Control (ATC), Advanced Traffic Management Systems (ATMS), and predictive maintenance optimize train scheduling, reduce delays, and enhance

asset utilization; energy-efficient trains reduces carbon footprints and operational costs; Smart sensors and surveillance systems monitor tracks, rolling stock, and stations, enhancing safety and reducing the risk of accidents; big data analytics identify trends in demand, optimizing routes and schedules for maximum revenue.

1.3.1 Public-Private Partnerships:

The British government introduced the idea of Public-Private Partnerships (PPP) with the creation of Private Finance initiative projects. Later, numerous governments adopted this concept under the moniker PPP. Although the term PPP or P3 has been in common usage since the 1990s, no single definition or model of a PPP has been universally accepted (Bernardino et al., 2010). These collaborations between public and private sector organizations are also referred to by a number of other acronyms, including privatization, blended financing (BF), private finance initiative (PFI), and public sector participation (PSP).

PPP has been defined differently by various organizations, some of which are given below:

“PPP means an arrangement between a government or statutory entity or government-owned entity on one side and a private sector entity on the other, for the provision of public assets and/ or related services for public benefit, through investments being made by and/or management undertaken by the private sector entity for a specified time period, where there is a substantial risk sharing with the private sector and the private sector receives performance-linked payments that conform (or are benchmarked) to specified, pre-determined and measurable performance standards”-*Department of Economic Affairs, India.*

“Public-Private Partnerships (PPPs) aim at financing, designing, implementing and operating public sector facilities and services. Their key characteristics include (a) Long-term (sometimes up to 30 years) service provisions, (b) The transfer of risk to the private sector, and (c) Different forms of long-term contracts drawn up between legal entities and public authorities. They refer to ‘innovative methods used by the public sector to contract with the private sector, who bring their capital and their ability to deliver projects on time and to budget, while the public sector retains the responsibility to provide these services to the public in a way that benefits the public and

delivers economic development and an improvement in the quality of life”- *United Nations*.

“A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance”- *World Bank*.

“PPP is any medium-to-long term relationship between the public and private sectors, involving the sharing of risks and rewards of multi-sectors skills, expertise, and finance to deliver desired policy outcomes.”- *Standard & Poor*

PPP generally introduces technological innovations and resultant efficiencies in infrastructure project construction and maintenance. It also provides additional resources through private funding, including international investments. Further, it minimizes the risks for Government Agencies.

It is contestable whether the scope of PPPs in Railways should be confined to only infrastructure or should also include services. Private participation in services is not viewed as PPPs in the European Union, where services were opened to competition after the 1991 EC Directive (EC Council Directive). This is also true in India for other transport sectors, e.g., road, aviation, and maritime.

Different models of the PPP that are in vogue are briefly explained in Appendix 9. These PPP models and the revenue streams associated with them are summarized in the following table 1.6:

Table 1.6 -PPP Type and Revenue Stream

Type	Revenue Stream
User-fee-based Build Own Transfer (BOT) models	User charges (roads, airports, etc.)
Annuity-Based BOT models	Equated payments (instalments) over the project life cycle (rural, health, education, etc.)
Performance-based Management/ Maintenance Contracts	Improving efficiency and benchmarking payments to service standards (water, Sewage and Waste Management (SWM), etc.)
Modified Design Build (Turnkey) Contracts	Payments linked to tangible construction milestones (not lump-sum payments) with incentives for early completion
Hybrid Annuity model	A mix of annuity and user fee

Source – Lectures of Sharmila Chavaly in the IRIFM Database

PPP Responsibility Matrix for Private and Government Sectors- Table -1.7

Table 1.7- Private vs. Government Responsibility Matrix in PPP Models

PPP Models Responsibilities	BOT (Toll)	BOT (Annuity)	HAM	DBFOT	O & M	BOOT	DBOT
Ownership	G	G	G	G	G	P	G
Financial	P	P	P/G	P	P/G	P	G
Construction	P	P	P	P	P	P	P
Design or Technical	P	P	P	P	P	P	P
O & M	P	P	P/G	P	P/G	P	P
Traffic revenue collection	P	G	G	P	P	P	P
Cost Overrun	P	P	P	P	P	P	P
Time Overrun	P	P	P	P	P	P	P
Political risk	G	G	G	G	G	P	G

Source: Volume 05, Issue 1, (January– 2018) ISSN (Online):2349–9745. (G= Government, P= Private)

1.3.2 Historical context of PPPs in India:

Public-Private Partnerships (PPPs) have played a critical role infrastructure development in India. While Indian Railways is a significant sector for PPPs, other sectors viz roads, airports, energy, and urban infrastructure have had substantial experiences with PPPs with a mixed bag of successes and failures. Early Phase (1990s): PPPs in India gained traction during economic liberalization in the 1990s, driven by the government's recognition of the need for private investment in infrastructure. Early initiatives focused on roads, ports, and power projects under frameworks like the Build-Operate-Transfer (BOT) model.

Expansion and Institutionalization (2000s): The establishment of regulatory bodies like the PPP Appraisal Committee (PPPAC) and initiatives such as Viability Gap Funding (VGF) in 2000s, lead to surge in PPP projects especially in roads (National Highways Development Project), airports, and urban infrastructure sectors. IR also initiated their efforts during this period.

Challenges and Adjustments (2010s): As the projects started maturing, issues like time and cost overruns, regulatory hurdles, and financing difficulties emerged, and the focus shifted to renegotiation, dispute resolution, and policy reforms like evolution of Hybrid Annuity Models (HAM) in roads.

Success Stories in PPPs: National Highways Development Project (NHDP) transformed India's road network by building high-quality highways, viz Golden Quadrilateral through BOT and HAM models. The key success factors being clear policy framework, competitive bidding, and strong private sector

interest. Similarly, Airport Modernization projects like IGI Delhi and Chhatrapati Shivaji Mumbai through joint ventures improved operational efficiency, passenger experience, and infrastructure quality. The clear delineation of roles, skilled private operators, and supportive policies facilitated this success. In energy Sector the Ultra Mega Power Projects (UMPPs) like Mundra in Gujarat provided large-scale power generation capacity, facilitated by large-scale financing, regulatory backing, and private expertise.

Challenges and Failures: It is not that all the PPPs projects were successful. There were failures also, like in Power sector Enron's Dabhol Project faced high tariffs, political opposition, and contractual disputes, leading to eventual failure due to lack of stakeholder alignment, sustainable pricing, and regulatory clarity. In Road Projects Financial stress, traffic overestimation, and land acquisition delays caused major players like GMR and GVK to exit PPP projects, underlying necessity for realistic demand assessments, risk-sharing mechanisms, and streamlined land acquisition processes. Resistance to tariff hikes and misaligned public expectations caused operational and financial problems caused failure of Urban Water Supply Projects, Khandwa, Nagpur, suggesting criticality of public engagement, transparency, and equitable cost-sharing models.

Global Comparisons: India's PPP experience mirrors global trends, where road, airport, and energy sectors generally succeed, while complex projects (e.g., water supply) face greater risks. Lessons from countries like Australia and the UK highlight the importance of adaptive governance, supportive policies and robust dispute resolution mechanisms. A focus on transparency, stakeholder engagement, and sustainable models is essential for scaling up PPPs effectively.

1.3.3 Models and PPP Policy Framework in Indian Railways:

There are numerous variations of PPP projects taken up all over the World. In this context, Indian Railways (IR), over the years, has modified the PPP model. It started with rail connectivity projects undertaken with non-govt resources either fully or partially, viz Pipavav Port Rail connectivity, Mundra port rail connectivity, Hassan-Mangalore rail line, which were executed around 2002-03, in partnership either in a joint venture or through entirely private investment. Pipavav port connectivity and Hassan – Mangalore rail projects

were executed by the Joint Venture companies where MoR is an equity holder. Mundra port connectivity was executed with the entire funding of the port itself. This participative scheme was further proliferated during the period 2005-06 till 2010-11 when five different projects were launched associating stakeholders including state government participating in the joint venture company. RVNL is associated with these JVs on behalf of Railways. These projects are the Kutch Railway, Bharuch - Dahej, Krishnapatnam, Haridaspur-Paradip, and Angul- Sukinda rail projects.

Further, in 2012, a participative policy was issued by MoR encompassing five models for the execution of rail connectivity projects through Extra Budgetary Resources from stakeholders/investors. The policy was issued to attract private investments in providing rail connectivity. As part of the 2012 policy, the following models have been allowed:

1. Non-Government Lines Model on revenue sharing
2. Joint Venture Model on revenue sharing
3. Built Own Operate and Transfer Model on revenue sharing.
4. Annuity Model of fixed fee recovery basis
5. Customer Funded Model on discount on freight moved on the project lines
6. Foreign Direct Investment (FDI) into Asset Creation

Three of these models (NGR line, Joint Venture, and customers funded) involve the participation of strategic investors/customers, and two others (BOT and Annuity models) are pure PPP models. The details of these models are illustrated as follows –

(i) Non-Government Private Line Model (NGR):

This model aims for private participation in augmenting first and last-mile connectivity to ports, cluster of industries, logistic parks and large mines handling goods for multiple rail users. The owner/developer shall bear cost of providing such connectivity and IR will pay user fee equal to 95% of the apportioned revenue, for the usage of infrastructure so created.

(ii) Joint Venture Model (JV):

This model aims to take up bankable new line and gauge conversion projects etc with stakeholders viz user of lines/ utilities such as ports, mines, exporters, plants and state governments. IR or its PSU will hold minimum 26% equity in such joint venture and the JV will get apportionment of the revenue based on traffic moving on JV railway line as user charges. The normal concession period for this model is 30 years.

(iii) Build, Operate and Transfer (BOT) Model through competitive bidding:

In this model, the private party will Design, Build, Finance, Construct and Maintain the project line. The project shall be bid out through competitive bidding to the private concessionaire and IR will pay user charges to the concessionaire equal to 50% of the apportioned revenue. The normal concession period under this model will be for 25 years and the asset will be transferred to IR after concession period at mutual agreed terms laid down in concession agreement.

(iv) Capacity augmentation with funding provided by customers:

In this model, industrial customers interested in expeditious completion of project can give project advance to IR in full or part for faster execution of rail connectivity. IR will compensate the investor paying upto 7% of the amount invested by them through freight rebate on freight traffic moved on the project rail line annually till the funds invested are recovered by the investor. The infrastructure under this model is owned by Indian Railways.

(v) Capacity augmentation through Annuity Model:

Under this model, the concession will be for financing and construction, and the project is bid out on concession by providing annuity payments to concessionaire.

IR has taken up twenty-four projects in partnership with public and private sectors mainly for port connectivity and gauge conversion. In terms of the partnership model, eight are projects with Rail Vikas Nigam Limited (RVNL), a 100% owned subsidiary of IR, on a Build Operate Transfer (BOT) basis, three with state governments (which can be termed as public-public partnerships), three private lines, two BOT projects with MoR and one BOT (annuity). The port connectivity projects are rather strategic in nature and not the PPPs in the Puritan sense, wherein a project is awarded through an open competitive bidding process. The Coal companies, Ports, and cluster of industries have come forward to provide rail connectivity, and State Governments/Local bodies/PSUs are also participating as stakeholders in the development of new lines/gauge conversion projects under the participative policy of MoR. In all such PPP Projects, train operation continues to remain with Railway. Till now, fourteen projects of INR 9234 crore have been completed through participative mode. Ten projects of INR 19417 Crore are under implementation, including coal connectivity and port connectivity projects, and

in addition, eight more projects of INR 13871 crore have been given in-principle approval (Table 1.8).

Table 1.8: Infrastructure PPP projects implemented/ under implementation on IR

Model	Scheme	No. of Projects (completed) INR in crore	No. of Projects (under implementation) INR in crore
Non-Government Private Line Model (NGR):	Cost developer - Developer gets 95% appportioned revenue e.g., Mundra/ Dhamra Port Railways Tariff fixation rights with Railways	4- 1302	
SPV/ Joint Venture Model (JV): Normal concession-30 yrs	JV with Indian Railways or Railway PSU with 26% stake JV gets 100% appportioned revenue e.g., Rail Vikas Nigam Limited, Dedicated Freight Corridor Corporation of India, Pipavav Railway Corporation Limited Tariff fixation rights with Railways	6- 6662	8- 18219
Capacity augmentation with funding provided by customers Infrastructure owned by IR Till amount recovered	Cost-- financed by Developer The developer is entitled to receive up to 7% of amount invested through freight rebate on freight moved till recovery of investment and interest e.g., NTPC funded line Tariff fixation rights vested in Railways	4- 1270	2- 1198
Build, Operate and Transfer (BOT) Model 25 years	Project bid out through competitive bidding to concessionaire- IR to pay user charges equal to 50% of appportioned revenue Tariff fixation rights with Railways		
Capacity augmentation through Annuity Model	Project bid out through competitive bidding to concessionaire- annuity payment to concessionaire		

FDI 2015	100% allowed MOR 26% Assured offtake - Alstom Madherpura- 800 Elec Loco-11 yrs 20000 cr GE Marhowra- 1000 diesel loco-11 years		
TOTAL		14- 9234	10- 19417

The new public-private partnership policy of IR has added about INR 30,000 crores so far, mainly in last-mile rail connectivity to many ports and industrial clusters, but it stands pale, given the requirements forecasted. According to the EY India study report on PPP in Indian Railways, a precipitous jump in private investment will be difficult in the present situation, where the IR is both the Operator and regulator.

The total Debt servicing cost incurred after 2012 (post participative policy) shows that had IR been able to get funding under PPP, a debt servicing cost of INR 3,37,876.14 crore in case of Rolling Stock and INR 3,70,019.97 crore under projects could have been saved and the resource so saved could have been used to bridge the throw forward liability/new investment of infrastructure expenditure (Table- 1.9):

Table 1.9: Debt servicing liability of IR towards IRFC financed assets/ projects

Year (INR /Crore)	EBR finance		Debt Servicing cost (Rolling Stock)			Debt Servicing cost (projects)			Amount actually paid on investmen t till date
	Rolling Stock	Projects	%	Amount of annual liability	Debt servicin g liability (15 years)	%	Amount of annual liability	Debt servicin g liability (15 years)	
2013-14	15225		11.365	1730.32	25954.82	-	-		11084
2014-15	11044		11.724	1294.80	19421.98	-	-		12882
2015-16	14097	9888	11.196	1578.30	23674.50	11.711	1157.98	17369.76	14048
2016-17	14279	11465	10.905	1557.12	23356.87	11.525	1321.34	19820.12	15598
2017-18	18808	14574	11.152	2097.47	31462.02	11.08	1614.80	24221.99	16983
2018-19	23736	27859	11.427	2712.31	40684.69	12.063	3360.63	50409.47	19088
2019-20	33376	32916	10.978	3664.02	54960.26	11.399	3752.09	56281.42	20853
2020-21	29110	78150	10.573	3077.80	46167.00	10.778	8423.01	126345.11	23898

2021-22	28171	32507	10.519	2963.31	44449.61	10.725	3486.38	52295.64	28917
2022-23	16716	13523	11.065	1849.63	27744.38	11.475	1551.76	23276.46	35880
Total	204562	220882			337876.14			370019.97	199231

**Under existing lease agreements in EBR-Financing, the primary contract period is 15 years for the entire debt servicing*

1.4 Challenges faced by IR in attracting private investment under PPP

Department of Economic Affairs under M/o Finance, to improve awareness and create a knowledge database on different types of PPP Models among various government key personnel and private sector organizations, have initiated the creation of a website with the name www.pppinindia.gov.in/infrastructureindia. The said website acts as a knowledge bank for modelling the PPP project and an awareness tool for up-to-date policies of the Public-private partnership of the Government of India. This database has the entire data of government investments taking place under the infrastructure sector from Independence across different modes of investments.

In the last 20 years, 97% of investment has been provided by Government Budgetary support, or internal resources or lease routes through its subsidiary IRFC. Railway over the years has created various organizations like IRFC, IRCON, RITES, DFCCIL, RVNL, RAILTEL, IRCTC, RLDA, IRSDC etc for specific purposes of railway-associated functions. They have either got loans to construct projects or provided Railways/Railway organizations with their expertise or finance to meet the requirements of Railways. However, these PPP figures are muted because most of the projects are done under the Special purpose vehicle (SPV mode). The examples are DFCCIL, CONCOR, other RVNL-partnered enterprises, and IRSDC is these models. Even though all of them added, those figures are still muted comparatively to what some other sectors in India have attracted investments under PPP and Private modes.

Some of the key reasons and challenges analysed by the industry experts on Railway PPP projects are the following.

- (i) **Land Acquisition Issues:** Rail projects require vast tracts of land, especially for laying tracks, setting up terminals, and constructing facilities. Acquiring land in India is complex due to fragmented ownership, resistance from local communities, and inflated valuations. Delays in land acquisition often escalate project costs and lead to time overruns, discouraging private sector participation. Projects like the Dedicated Freight Corridors faced delays due

- to prolonged land acquisition processes, affecting timelines and investor confidence.
- (ii) **Bureaucratic Hurdles:** IR has deeply entrenched bureaucracy with layers of approvals, lack of inter-departmental coordination, and rigid policies that slows decision-making and execution. The Zonal and Divisional administration shows a lackadaisical attitude towards these projects and the problems of the Developers. Different departments often work in silos and obstruct the smooth functioning of the same. Private players have to deal with multiple authorities and face delays in obtaining clearances, finalizing contracts, and addressing grievances, leading to cost overruns and missed deadlines. The Station redevelopment program suffered setbacks due to delayed approvals and bureaucratic red tape, causing private players to withdraw from some projects.
 - (iii) **Political Interference:** Political considerations, such as fare regulation and employment policies override commercial concerns in rail projects. Private investors are deterred by the risk of changes in policy or direction based on political exigencies rather than economic rationale. The introduction of privately operated trains under the PPP model faced resistance from unions and political groups, resulting in reduced interest from private bidders.
 - (iv) **Financial and Revenue Risks:** Rail projects are capital-intensive with long gestation periods. Revenue risks arise from uncertain traffic demand, low freight margins, and tariff regulations. The private players hesitate to invest large sums in rail projects without assured returns. The freight corridor projects failed to attract private financing due to concerns over revenue sharing and traffic projections.
 - (v) **Complex Regulatory Environment:** Lack of a single regulatory body for railways creates ambiguity and inefficiencies. Overlapping jurisdictions between the Ministry of Railways, state governments, and local authorities complicate project execution and the Investors face uncertainty in regulatory compliance and conflicts between stakeholders.
 - (vi) **Inadequate Risk Sharing:** It is general perception that there is disproportionate share of risks (e.g., demand, cost overruns) on private players without adequate safeguards or support mechanisms, which discourages reliable investors from entering the sector. The Rail Coach Manufacturing PPP at

- Kanchrapara failed because private investors found the risk-reward balance unfavorable.
- (vii) Most of the projects under PPP are sanctioned/approved based on case-to-case viability. That leaves too much subjectivity/discretion with the Railways and the feeling of unfairness with the developer.
 - (viii) The Model Concessionaire agreement for different aspects of Asset construction has been prepared only very recently. There used to be no such document, so the developer often feels shortchanged, and the bureaucrat becomes too circumspect.
 - (ix) The absence of independent regulator impacts making discretionary decisions such as fixing the price, sharing revenues between different stakeholders, addressing exceptional Traffic non-fulfilment and overfilling, etc. The absence of Dispute Settlement bodies also hindered their performance.
 - (x) EPC is the preferred PPP Contract mode, and there are a huge number of time and cost overruns. Often, vendors with little technology but the ability to manage Railway administration are generally the interested parties in such scenarios.
 - (xi) In Railway, PPP projects are often driven by PSUs such as CONCOR, RVNL, IRCON, RITES, etc. As publicly listed corporations, they often tend not to take risks in very long-gestation, traffic revenue-variable projects. Further, they act as decision followers rather than policy setters.
 - (xii) The ability to attract huge investments to fulfil the above plan of action can only be achieved through the right choice of PPP policies. For the same, Indian Railways is in the process of giving greater scope for private players to invest in the Railway Sector. Hence, it is crucial to understand the investment pattern in different sectors of infrastructure in India.

1.5 Infrastructure Investment in India

Over the last seven decades of Independence, the Government of India has invested vast sums of money in infrastructure. The Source of data on figures in this section has been derived from the search database of Infrastructure.gov.in website of the Department of Economic Affairs and synthesized for presentation. The history of the infrastructure investment in India can be seen from the following table: (Table-1.10)

Table-1.10: Year-wise infrastructure investment in India

Financial Year	Number Of Project	Total Project Cost (INR Crore)	Govt PPP		Govt		Pvt Sector	
			No. of Project	Total Project Cost (INR/Crore)	No. of Project	Total Project Cost (INR/Crore)	No. of Project	Total Project Cost (INR/Crore)
2026-2027	1	2,967.00			1	2,967.00		
2024-2025	2	2,582.00			2	2,582.00		
2023-2024	2	2,368.00			2	2,368.00		
2022-2023	1	328			1	328.00		
2021-2022	4	3,667.62			4	3,667.62		
2020-2021	8	11,200.89			8	11,200.89		
2019-2020	266	1,11,745.52	2	3,090.01	261	1,06,359.51	3	2,296.00
2018-2019	31	88,841.18	3	4,079.38	27	84,637.65	1	124.15
2017-2018	265	1,43,500.50	18	14,862.30	222	1,10,111.70	25	18,526.50
2016-2017	1340	9,16,064.74	139	2,32,979.19	1025	5,91,408.04	176	91,677.51
2015-2016	1368	7,53,830.26	93	2,21,337.95	1045	4,03,859.81	230	1,28,632.50
2014-2015	1078	6,03,769.86	94	2,32,938.38	705	2,81,462.26	279	89,369.22
2013-2014	1007	4,82,912.84	92	82,576.09	733	3,26,536.19	182	73,800.56
2012-2013	673	4,51,907.49	125	1,30,411.66	386	2,32,069.91	162	89,425.92
2011-2012	608	7,50,239.69	161	4,75,178.32	360	2,32,514.71	87	42,546.66
2010-2011	518	4,45,147.02	172	2,03,582.34	295	1,35,239.30	51	1,06,325.38
2009-2010	409	4,21,325.49	121	2,26,810.82	261	1,30,035.54	27	64,479.13
2008-2009	361	4,31,222.77	109	1,11,190.69	237	2,96,098.75	15	23,933.33
2007-2008	261	3,28,650.51	136	1,19,763.82	115	1,76,359.19	10	32,527.50
2006-2007	186	2,34,686.64	83	1,43,320.60	98	81,737.04	5	9,629.00
2005-2006	138	1,16,564.23	85	82,397.35	50	31,656.88	3	2,510.00
2004-2005	92	1,05,426.32	47	20,322.01	45	85,104.31		
2003-2004	45	64,710.01	28	11,008.75	17	53,701.26		
2002-2003	38	33,615.22	30	20,599.92	8	13,015.30		
2001-2002	37	31,212.53	29	26,412.45	8	4,800.08		
2000-2001	36	17,046.70	20	9,251.57	15	5,678.63	1	2,116.50
1999-2000	25	25,787.53	10	2,826.57	15	22,960.96		
1998-1999	16	17,901.43	13	16,040.34	3	1,861.09		
1997-1998	22	11,056.19	11	2,463.37	11	8,592.82		
1996-1997	13	12,321.30	5	3,574.48	8	8,746.82		
1995-1996	11	6,430.17	2	1,265.95	9	5,164.22		
1994-1995	2	353.11			2	353.11		
1993-1994	6	11,677.93	5	11,571.65	1	106.28		
1992-1993	6	3,946.99			6	3,946.99		
1991-1992	7	8,412.63	2	3,412.84	5	4,999.79		
Others / Not Available	359	1,59,588.01	189	82,271.12	166	76,886.89	4	430
Total	9242	68,13,008.32	1824	24,95,539.92	6157	35,39,118.54	1261	7,78,349.86

Investments in Infrastructure - Source:

<https://www.pppinindia.gov.in/infrastructureindia/home>

It can be gauged from the above that out of the total infrastructure investments of INR 68 lakh Crores. Central Government infused investments is about 52% and is decreasing year on year as a percentage because of the developing country's constraints on high social sector needs. In comparison, the public-private partnership (PPP) amounts to about 37% of the total infrastructure funding and is increasing its share over the years very fast. Moreover, the Private funded Infrastructure amounts to about 12% of total investments. The increasing share of PPP and Private in Infrastructure indicates the increasing maturity and ability of the Private Sector to take up more complex engineering and social infrastructure projects in India. With the help of the same data, we have analyzed these different types of investments entered into different Sectors of Infrastructure in India. The following table depicts the infrastructure created in different sectors/sub-sectors of the economy (Table 1.11):

Table-1.11: Sector-wise infrastructure investment in India

Sector/Sub-sector	Number Of Project	Total Project Cost (INR/Crore)	Govt PPP		Govt Traditional		Pvt Sector	
			No. of Project	Total Project Cost (INR/Crore)	No. of Project	Total Project Cost (INR/Crore)	No. of Project	Total Project Cost (INR/Crore)
Communication	62	9,02,117	60	8,75,935	1	13,334	1	12,848
Telecommunication Network and Services	60	8,75,935	60	8,75,935				
Telecommunication towers	2	26,182			1	13,334	1	12,848
Energy	3511	30,90,345	469	8,21,318	1882	15,57,839	1160	7,11,188
City gas distribution	3	432			3	432		
Electricity Distribution	16	28,757	16	28,757				
Electricity generation (grid)	371	16,30,471	79	3,99,371	146	7,81,578	146	4,49,522
Electricity transmission	1378	4,32,594	34	29,214	1337	4,01,389	7	1,991
Gas pipelines	54	1,05,225			50	95,870	4	9,355
Oil pipelines	41	21,681			40	21,531	1	150
Oil/ Gas/ LNG Storage	42	45,654	1	905	38	41,931	3	2,817
Renewable energy (grid)	1606	8,25,530	339	3,63,071	268	2,15,107	999	2,47,352
Social and Commercial Infrastructure	323	93,982	161	18,319	79	27,727	83	47,936
Cold Chain	12	3,459	8	1,611	3	1,798	1	50
Common infrastructure for industrial parks, SEZ	187	80,903	29	7,089	76	25,929	82	47,885
Education	37	469	37	469				
Health Care	14	1,413	14	1,413				

Post-harvest storage infrastructure for agriculture and horticulture produces including cold storage	20	650	20	650				
Tourism	53	7,088	53	7,088				
Transport	3790	19,45,575	1015	7,64,007	2763	11,75,626	12	5,941
Airports	74	57,767	11	35,924	62	20,343	1	1,500
Inland waterways	8	5,168			8	5,168		
Ports (excluding captive)	152	1,61,128	99	1,39,100	43	17,836	10	4,192
Railway track, tunnel, viaducts, bridges	568	5,12,622	9	15,398	558	4,96,974	1	250
Roads and bridges	2872	9,58,509	824	5,38,820	2048	4,19,689		
Urban public transport (except rolling stock)	116	2,50,382	72	34,766	44	2,15,616		
Water Sanitation	1556	7,80,991	119	15,961	1432	7,64,593	5	437
Irrigation (dams, channels, embankments, etc.)	616	5,85,985	1	9	614	5,85,869	1	107
Sewage collection, treatment and disposal system	274	44,675	21	1,422	253	43,253		
Solid waste management	74	8,739	70	8,375	4	364		
Storm water drainage system	69	9,241			69	9,241		
Water supply pipeline	478	1,25,082	20	4,760	458	1,20,322		
Water treatment plants	45	7,268	7	1,394	34	5,544	4	330
Total	9242	68,13,008	1824	24,95,540	6157	35,39,118	1261	7,78,350

The sector-wise investment. Source:

<https://www.pppinindia.gov.in/infrastructureindia/home>

The following points can be gauged from the above table.

- ❖ Power Sector – Distribution, Generation, and Transmission have attracted the maximum investments led by the apt reforms taken at every level. It attracted INR 16+ Lakh crores.
- ❖ Road Sector – attracted investments to the tune of INR 10+ Lakh crores with the majority coming from PPP.
- ❖ Telecom Network – attracted investments to the tune of INR 8.75+ Lakh crores with the entire amount coming from PPP. Over the past twenty years, India has enhanced the coverage ratio and made cell phones easily accessible to the common man.
- ❖ Irrigation (INR 5.85+ Lakh crore) and Railways (INR 5+ Lakh crore) – attracted investments majorly from the Government sector.
- ❖ However, at this point, to match other countries such as the USA, China, and ASEAN countries, the Government of India needs to put in almost INR 50 lakh crore of infrastructure investment into Rail infrastructure, keeping because of its beneficial economics. Such humongous can't be borne by the

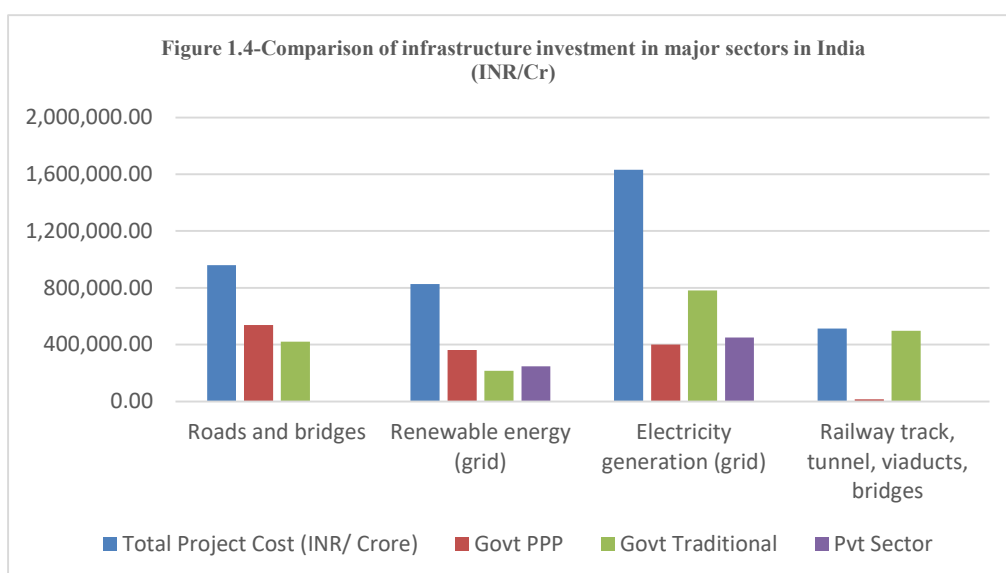
government alone more so because of the huge social infrastructure that needs to be met by India. Hence the way we structure PPP policies in Railway Infrastructure goes a long way in fulfilling our objectives. For further analysis, we need to look at how other successful sectors attract higher amounts of PPP and Private investments framed their policies.

- ❖ Based on historical data about PPP investment across various sectors, it seems that the Power and Road sectors excel in addressing the interests of all PPP players. Table 1.12 displays the comparison of performance:

Table-1.12: Comparison of infrastructure investment in major sectors in India

Sector/Sub-sector	No. of Project	Total Project Cost (INR/ Crore)	Govt PPP		Govt Traditional		Pvt Sector	
			Number Of Project	Total Project Cost (INR/ Cror e)	Number Of Project	Total Project Cost (INR/ Cror e)	Number Of Project	Total Project Cost (INR/ Cror e)
Roads and bridges	2872	9,58,509	824	5,38,820	2048	4,19,689		
Renewable energy (grid)	1606	8,25,530	339	3,63,071	268	2,15,107	999	2,47,352
Electricity generation (grid)	371	16,30,471	79	3,99,371	146	7,81,578	146	4,49,523
Railway tracks, tunnels, viaducts, bridges	568	5,12,621	9	15,397	558	4,96,974	1	250

Source: <https://www.pppinindia.gov.in/infrastructureindia/home>



- ❖ The table above illustrates that Railways has not succeeded in attracting private sector and PPP models of investment as compared to the Renewable Energy and Road Sectors. Railways were always looking inward or towards the government support for investments, and the PPP policy was not attractive enough to attract Private sector investors.

1.6 Comparison of policies in the Power, Roadways, and Railways sectors

Table 1.13 lists the policy distinctions between the Power Sector, the Road Sector, and Indian Railways.

Table-1.13: Policy distinctions amongst the Power, Road Sector and IR

Description	Power Sector	Road Sector	Indian Railways
Reforms undertaken	- Unbundling of the sector-separation of Generation, Transmission, and Distribution - State Government controls generation and distribution through concurrent subjects. - The Central Government drives investment through National Thermal Power Corporation, National Hydroelectric Power Corporation, Nuclear Power Corporation for generation and Power Grid Corporation of India for transmission. - The generation sub-sector is completely liberalized. - As long as the power plants follow the standards fixed by the Central Electricity Authority, the sector is technology neutral.	- Policy formulation and execution is separated. - Ministry of Road, Transport and Highways legislates the policy and National Highway Authority of India executes the policies and coordinates the initiatives. - The construction work is PPP driven. - Road development is on the Concurrent subject list under Schedule VII of the Constitution and while highways are developed by the Centre, the other roadways are developed by the States. - Transparent methods applied to standard notification and facilitation of PPP projects.	- Both policy formulation and execution is centralized with the Ministry of Railways. - Project execution is generally done through Railway Public Sector Undertakings viz RVNL, IRCON etc. - The construction work in zonal railways is financed from government funds and internally generated railway funds. - Research Design and Standards Organisation provides technical specifications for technology, vendor approval etc.
Procurement process and standard creation	All the projects are set up and if the demand exists, the Power Purchase	Build Operate and Transfer and, Build Operate and Transfer (Toll)	The Railway PSUs have created Special Purpose

	Agreement can be obtained from the regulator, .Power Purchase Agreement applies in both the private and public sectors. . State Governments have devised favourable policies to promote renewable energy.	etc are preferred models in these projects. .Conducive guidelines on Infrastructure Investment Trust for release of funds to sponsors to invest in the projects.	Vehicles in collaboration with private parties for carrying out infrastructure projects. .Indian Railway Finance Corporation raises funds from market and invests in rolling stock and projects and leases them to IR .Container Corporation of India is to fund Inland Container Depot, Freight Terminals and Cold chain infrastructure. .Dedicated Freight Corridors Corporation Limited has been created to develop dedicated freight corridors to provide speedy freight services. .So far Engineering Procurement and Construction (EPC) is the preferred contract mode
Model concessionaire agreement	The model concession agreements are available for all sub-sectors viz., generation, distribution and transmission	Model concession agreements are available for various models	Model concession agreements are available from 2014

Project and investment analysis	The investments in these projects are determined by needs and private sector participation is guided by the use of economic analysis of projects.	Detailed data analysis facilitated better economic viability of projects, definite time schedule for financial closure and better project monitoring.	Investment decisions in railway infrastructure are largely steered politically without a proper financial appraisal, leading to large shelf of projects with inadequate budgetary allocations till 2014. Financial analysis is essential for investment decisions in cost-intensive rail infrastructure projects.
Project Monitoring	.The private party is responsible for financial closure and construction. 2. Power Purchase Agreement comes to operation after commercial operationalization date.	Streamlined system for the formation of Special Purpose Vehicles and time bound execution of the agreement.	Lackadaisical monitoring mechanism leading to time and cost over-runs
Exit and trade provisions	. Setting up of Power Exchange has stimulated the proliferation of Private sector Power Plants 2. Infrastructure Investment Trust mechanism has facilitated the private participants to raise funds for investments	IRB Infrastructure Investment Trust mechanism facilitated the private participants to raise funds for investments	.Incoherent Policies on PPP, viz, Private Freight Terminals policy, Own Your Wagon policy, Policy on PPP projects, etc. 2.No clear mechanism for exit/ trade provisions resulting in lesser efficient utilization of investment.

The investments from the private sector have been much lower than expected. This calls for a review of the reasons for this shortfall and take necessary action since IR has envisaged substantial private participation in its future plans. An analysis of IR's policies on PPPs and the experience with SPVs in the infrastructure sector brings out the fact that IR approach towards PPPs has been limited only to leverage private capital. The narrow approach has resulted in unsustainable/inefficient partnerships, leading to market failure-like situations. IR has failed to create an environment where the private sector can do more than just contribute to the project cost and as a result, PPPs in IR have not yet taken off. There is only one BOT (annuity) project, which has been awarded through competitive bidding. All other projects are strategic partnerships and cannot be termed as 'PPPs' wherein competitive bidding is one of the essential components. The initiative of infrastructure SPVs is also facing several challenges due to the in-conducive business environment. This calls for a review of objectives and outlook towards PPPs for IR's infrastructure projects. The modernization committee also supports this by stating "review the existing PPP policy framework in the light of hitherto poor response and PPP experience" as one of the recommendations (Sam Pitroda Committee, 2012). The above context also calls for more scientific knowledge on various aspects of PPPs in railways. Research-based inputs on various policy aspects such as deciding the project scope, partnership model, risks that can be transferred, dealing with financially unviable projects etc are important for the policy.

1.7 Critical Success Factors (CSFs) of PPP Infrastructure Projects

The public-private partnership (PPP) involves a complicated procedure, long concession time, high-risk investment and collaboration amongst various stakeholders. Therefore, necessitates a full study of PPP's crucial elements. Many studies have been conducted on PPP CSF identification (Alinaitwe & Ayesiga, 2013), relationships among CSFs of PPP (Ng et al., 2010; Shi et al., 2016). These factors are considered responsible for the success/ failure of a PPP project, which means it meets the community needs, government objectives, positive financial return to private investors etc. It is necessary that CSFs are identified in the beginning itself and taken into account to develop a feasible and effectual framework to manage a PPP project effectively (Xueqing, 2005). Yuan & Zhang (2019) identified fifteen KPIs and divided these into five categories i.e. stakeholder, physical project features, finance and commercial,

invention and training, and process indicators. Li et al. (2005) identified eighteen CSFs and placed them in five categories viz attractive economic circumstances, readily available finance market, efficient procurement, project implementation expertise, and government grants in building PPP projects in the United Kingdom.

1.8 Significance of study

As can be seen, IR needs extensive participation of the private sector in its infrastructure projects. A sustainable PPP refers to a partnership between public and private sectors that integrates economic, environmental, and social considerations into the planning, execution, and management of projects to ensure long-term value creation. These partnerships are designed not only to meet the immediate infrastructure or service needs but also to contribute positively to broader sustainability goals, such as reducing environmental impact, promoting social equity, and ensuring economic viability over the project's lifecycle. By embedding sustainability principles into PPP frameworks, governments and private entities can collaboratively create projects that deliver enduring benefits. However, there is an apparent lack of clarity on 'how to structure' a sustainable PPP model to make it appealing to the private sector while transferring considerable risks. Typical policy questions based on the sector's larger objectives include: (i) which activities could be given to the private sector, (ii) whether to award these to a single entity, several entities or consortia, (iii) measures that are needed to make the project commercially viable, if revenues generated are not sufficient, and (iv) what regulatory initiatives and action would be necessary to safeguard the interests of participating stakeholders comprising government, private entities, and the users, and so on. This study focuses on these elements and endeavours to explore a sustainable PPP model for IR's infrastructure projects. Experiences around the world reveal that a well-designed/structured project can avoid many hurdles at later stages.

In the railway industry, PPP principles are continually evolving. Because the railway sector structure encourages vertical integration and economies of scale, the emphasis on PPPs and competition has been a source of great dispute. Although there is agreement in the academic literature that successfully designed and operated PPPs can yield greater economies, they are criticized for a variety of reasons, including higher borrowing costs and more risks involved

(Dehornoy, 2012; Highton & Clark, 2010; Sarmiento & Renneboog, 2014). This study is founded on the idea that, when constructed and managed properly, PPPs are a fundamentally successful vehicle for providing infrastructure and services in any industry, including railways. The Ministry of Railways needs to analyse the success factors of PPP in the Power and Road sectors, strategize key areas for PPP and make conducive PPP policies and models which attract the private investments required in its infrastructure projects.

1.9 Dissertation Structure

The present study intends to explore an ideal sustainable PPP model for Indian Railway infrastructure projects as research problem with following research questions:

RQ1: What are the Critical Success factors of PPP projects?

RQ2: How do stakeholder relationship impact PPP projects in Indian Railways and what role regulations and governance play in these projects?

RQ3: How can a PPP framework be developed to enhance stakeholders' relationship and improve the effectiveness of execution of IR PPP projects?

Research Objectives are as follows:

RO1: To study critical success factors in different PPP models in railways infrastructure projects.

RO2: To analyse impact of stakeholders' relationship and regulatory intervention happening in IR's infrastructure PPPs.

RO3: Develop a process framework of sustainable PPP model for IR's infrastructure projects.

The dissertation is organized into five chapters. The first chapter contains the introduction and context for this research by identifying the need for PPPs in Indian Railway infrastructure projects and the issues in the current public-private partnership infrastructure policies and projects of IR.

Chapter 2 reviews various aspects of the literature on PPP infrastructure projects. It includes reviewing the peculiar characteristics of the railway sector that need attention in designing PPPs, analysing the impact of sustainability, railway PPP projects worldwide, best PPP practices from other sectors, inference and lessons learned from Literature reviews and literature gaps.

Chapter 3 discusses the research methodology and Chapter 4 reviews data analysis, provides success factors for sustainable PPP, analyses case studies on Models and PPP Policy framework of infrastructure SPVs in Indian Railways

and Chapter 5 provides a possible framework for sustainable PPP in IR and scope for future research based on insight gained from the Literature Review, case studies and discussions.

Chapter 2

Literature Review

With the intent to probe the existing literature on PPP with an emphasis on Railways the literature review was conducted, and numerous research articles, manuscripts, reports, and orders were reviewed with the following Keywords:

- Indian Railways
- Railway Infrastructure in India
- Infrastructure financing in Railways
- PPP in Railways
- PPP projects and agreements
- Railways PPP agreements/ concessionaires
- Constraints and risk allocation in Railways PPP projects
- Regulator in PPP

A total of 150 papers were reviewed from Google Scholar, Science Direct and Web of Science search to find out relevant authors (by a number of citations). Analysis of the upgradation of their work (by studying papers which have cited the above authors, relevant to the keywords). The review was made current and contemporary, by searching articles and papers published between 2000 and 2024. The papers and articles that had search terms that matched the research title or keywords were chosen for in-depth analysis; otherwise, any paper that mentioned Indian Railways, even in passing, would have included the aforementioned search terms and would have included a huge number of articles, very few of which would have truly focused on the necessary parameters.

In the first round of the search for literature review, 150 academic, peer-reviewed articles were examined and sorted in three stages according to their contents. The articles and publications that mentioned pertinent information about PPPs and PPPs for railway infrastructure were kept, though no document, report, or article specifically stated the current state of PPPs on IR. After all the inclusions and exclusions, 120 published articles, Indian Railway Annual Reports, reports from government-appointed committees on PPP projects, and NITI Aayog's reports on Indian Railway were determined to be pertinent to the

intended research to determine the current state of investment planning, sources of infrastructure financing, the necessity of PPP in rail infrastructure, the crucial success factors necessary for such investments, policy initiatives to attract private investment, and the impact of such initiatives on India's rail infrastructure. The chosen articles, documents, and reports have been meticulously reviewed and assessed for their relevance to the research work.

2.1 Major Themes

- Stakeholders' relationship
- Government Policy
- Critical success factors of Public Private Partnership

Literature Review:

Table 2.1: Summary of exploratory studies

<i>Major Theme</i>	<i>Sub Theme</i>	<i>Authors (as per major citation count)</i>	<i>Inference</i>
<i>Stakeholders' relationship</i>	<i>Relationship with Government and inter-parties' relationships</i>	(Alexandersson & Hultén, 2009; Baccelli & Morino, 2020; De Schepper et al., 2014; Dementiev, 2016; Fay et al., 2021; Harman et al., 2015; Loosemore & Cheung, 2015; Meunier & Quinet, 2021; Ng et al., 2013; Nizkorodov, 2021; Sresakoolchai & Kaewunruen, 2020; Wu et al., 2016)	<i>Integrated cooperation is required among stakeholders, PPP is a relationship amongst many stakeholders with different objectives and thus differences are required to be identified, understood, and integrated into the project to make PPPs successful, Collaboration with stakeholders at the earliest stage of PPPs may provide clarity on their expectations and bring synergy to the project.</i>
<i>Government Policy</i>	<i>Social Welfare</i>	(Välilä, 2020)	<i>Public procurement decisions are</i>

			<i>influenced by social welfare considerations</i>
	<i>Government Objectives and Regulations</i>	(Abhilash & Chandy, 2016; T. Ahmad & Chang, 2020; Asamoah et al., 2022; Carnis & Yuliawati, 2013; Chang, 2013; de Jong et al., 2010; Evenhuis & Vickerman, 2010; Haralambides & Gujar, 2011; Huang et al., 2021; Laurino et al., 2015; Lin & Kuang, 2017; Lixin & Fengli, 2017; Özcan, 2018; Panayides et al., 2015; Pangotra & Raghuram, 1995; Polyakova & Vasilyeva, 2016; Roll & Verbeke, 1998; Ruiz Diaz, 2017; Song et al., 2019; Walters & Pisa, 2023; Zaharioaie, 2012),	<i>Govt. policy, conducive regulation and financial instruments for private investment is a must for attracting PPP. Both the excessively restrictive concessions as well as establishing too many concessions can deprive PPP of benefits, Regulation of six major areas viz environment, safety, security, service levels, pricing, licensing, and dispute resolution is needed in success of PPP. A clear government policy and scrupulous implementation thereof are a must for transport infrastructure planning.</i>
	<i>Political uncertainty</i>	(Carpintero & Siemiatycki, 2016; de Jong et al., 2010)	<i>Political considerations do influence a range of aspects which may affect</i>

			<i>positively or negatively, the performance of PPP projects.</i> <i>Stable and supportive Government policies besides proactive approach to adjust the PPP arrangements as per demand of the varying situation/problems is vital.</i>
<i>Public Private Partnership</i>	<i>Unbundling of Project</i>	(Galenson & Thompson, 1993b; Gangwar & Raghuram, 2017; Garg & Garg, 2017; J. Yuan et al., 2021)	<i>Unbundling of projects is better for PPP, Having regard to the complexity of the railway system, the allocation of specific tasks by unbundling, to the private sector is a prerequisite for private sector engagement,</i> <i>More assets and services must be opened to private management and participation for PPPs in the rail industry to be successful and mere outsourcing of services, catering, construction, and building maintenance will not</i>

			<i>increase private participation.</i>
	<i>Need of PPP</i>	(Albalade & Bel-Piñana, 2019; Alexandersson & Hultén, 2009; Dhingra & Sharma, 2022; Gatti, 2023; Geest & Núñez-Ferrer, 2011; Yescombe & Farquharson, 2018)	<i>PPP mode in Project financing improves the efficiency and quality of public service delivery,</i> <i>PPPs are capable to deliver 1) better service quality, 2) lesser project costs, 3) risk division, 4) faster and timely construction saving time/ cost over-runs, 5) better budgeting and financing, and 6) optimal life cycle costs,</i> <i>Total costs are more in public railways than in the PPP</i>
	<i>Value of money in PPP</i>	(Grimsey & Lewis, 2005)	<i>The gains from better operation processes and management, improved efficient project execution, improved service delivery, and access to the cutting-edge technology make-up for the extra costs involved on account of borrowing,</i>

			<i>transaction and administration costs of PPP projects.</i> <i>Mere financial value for money in PPP is debatable</i>
	<i>Success Factor and Sustainability Consideration in PPP</i>	(Ahmadabadi & Heravi, 2019; Alinaitwe & Ayesiga, 2013; Babatunde et al., 2016; Chou & Pramudawardhani, 2015; Evenhuis & Vickerman, 2010; González-Medrano & Rotellar-García, 2023; Hsueh & Chang, 2017; Hueskes et al., 2017; Leviäkangas et al., 2015; H. Liu et al., 2016; Nizkorodov, 2021; Peda & Vinnari, 2020; Shi et al., 2016).	<i>Identification and incorporation of sustainability considerations in PPP infrastructure projects is of prime importance.</i> <i>The divergent goals of public and private partners pose a tension between profitability and public welfare in the sustainability-oriented PPPs.</i> <i>The success of PPP requires the provision of proper risk allocation, unambiguous and stable agreement, financial suitability through judicious monetary package, trustworthy concessionaire syndicates with sound specialized strength, and supportive eco-system.</i>

			<i>The critical success factors of PPP include proficient procurement process, efficient project execution capability, positive administration, conducive and monetary and financing conditions, steady socio-political ecosystem, stable macroeconomic environment, straight forward acquirement framework, judicious government policies, and clear division of responsibility among public entity, private sector and general society.</i> <i>Successful PPP require presence of thorough pre-project evaluation, effective feasibility analysis, well-drawn implementation plan, efficient Value for money evaluation, transparent procedures and interface</i>
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		management, competitive and fair bidding procedure, effective financial closing techniques, well-organized contract management, regulated legal and conflict resolution framework, efficient facility management, defined commitment and accountability, clear responsibilities and roles, and good governance. Sustainability Consideration in PPPs include conducive legislative and investment eco-system, efficient PPP project selection mechanism, public backing, competent quality service simpler credit system, comprehensive agreement to handle variation and escalations, and appropriate stakeholder commitment instrument etc
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			<i>The success factors of PPPs include favourable Legal and political support, economic stability, favourable finance market, social acceptance, financial viability, comprehensive contractual agreements, transparent procurement process, efficient collaboration and reliable private partners.</i>
	<i>Successful models of PPP</i>	(ADB, 2008; Caetano Roos et al., 2024; European Commission, 2003; Kumari, 2016; Verweij & Meerkerk, 2020; Wang & Zhang, 2016)	<i>Design and build (DB), Design, build, finance, and maintain (DBFM), Design, build, finance, maintain, operate (DBFMO), Build, operate, transfer (BOT), Build, operate, own, transfer (BOOT), Build, operate, lease, transfer (BOLT), etc. are the most common PPP models.</i> <i>Design, build, finance, and maintain (DBFM) is</i>

			<i>better than Design and Construct model.</i> <i>There can be a variety of approaches for PPP, and there is no definite universal or effective model exists for different PPPs.</i>
	No. of bidders	(Di Pietrantonio & Pelkmans, 2004; Finger & Montero, 2020; T. Liu et al., 2016; Zitron, 2006)	<i>No. of bidders depend upon risk of bidding, risk of project, transparent tendering process,</i> <i>Financial measures like viability gap funding, other non-fare revenue streams are necessary in Rail Infrastructure projects with private participation.</i> <i>It is necessary to have an independent regulator to guarantee open access, fair competition for prospective operators and reduce barriers in entry and participation besides regulating the track access charges payable by the train operators.</i>

			<i>Participations in bidding is influenced by transparent and competitive procurement process, impartial and effective administration, and availability of qualified people in PPP execution.</i>
	<i>Barriers of PPP</i>	(M. Ahmad & Raza, 2020; Akomea-Frimpong et al., 2021; Babatunde & Perera, 2017; Cavdar & Aydin, 2015; Chen et al., 2015; Chileshe et al., 2021; Dolla & Laishram, 2021; E. et al., 2012; Hu et al., 2018; Jiannan et al., 2019; Junxiao et al., 2014; Larhsoukanh & Wang, 2019; Leiringer, 2006; Y. Li & Wang, 2019; H. Liu et al., 2020; J. Liu et al., 2020; J. Liu & Wei, 2018; Lv et al., 2021; Mahapatra & Sahoo, 2017; Malik & Kaur, 2020; Mashwama et al., 2019; Mateen et al., 2018; McQuaid, 2019; Okyere et al., 2019; Osei-Kyei & Chan, 2017; Parakhina et al., 2020; Patibandla & Sethi, 2018; Pellegrino et al., 2019; Phang, 2007; Qian et al., 2020; Rajasekharan & Varghese, 2021; Ray & Ing, 2016; Ren et al., 2021; Renxu & Li, 2021; Salman & Xueqing, 2021; Sharma & Newman, 2018; Sinha & Jha, 2019; Tserng et al.,	<i>Common barriers of PPR are technical barriers, Financial barriers, regulatory and Political barriers, Social barriers, Legal barriers, Institutional Barriers, Cultural and Geographical barriers, Railways is a network utility, with its unique characteristics viz government ownership, sunk costs, natural monopoly, and economies of scale and scope that act as barriers rendering private participation challenging and difficult, Dearth of expertise is one of the obstacles</i>

		2014; Verweij & van Meerkerk, 2021; Weththasinghe et al., 2012; Xinjian & D., 2020; X.-X. Yuan & Zhang, 2019; Zakharova et al., 2015; Zhao et al., 2021; Zheng et al., 2021; Zhu, 2020)	<i>in PPPs which not only restricts PPP formation but also holds back efficiency gains in PPPs.</i>
	<i>Contract theory perspective on PPP Risk allocation</i>	(Alexandersson & Hultén, 2009; Berezin et al., 2018; Caetano Roos et al., 2024; Cheng et al., 2021; Gangwar & Raghuram, 2017; Han et al., 2019; Harding et al., 2010; Hwang et al., 2013; Lima et al., 2021; Otto et al., 2019; Shen et al., 2006; Shrestha et al., 2019; Smith & Gannon, 2008; Tang et al., 2010; Yao et al., 2018)	<i>Risk mitigation optimizes stakeholders' goals, improves private participation, project performance, enhances the sustainability objectives with the delivery of enhanced operational efficiency and improved social and end-user benefits.</i> <i>PPPs are subject to various risks associated with construction, finance, revenue, availability, inter-party, quality standards, political and regulatory etc. For successful PPP, it is necessary that all these risks are identified and allocated to the party that can manage them more appropriately, Risk identification,</i>

		<i>its proper allocation and independent regulatory processes in concessions are necessary for the success of PPP in transport infrastructure.</i> <i>The regulatory risk is better suited for the public entity and the risks associated with construction, availability, and quality standards for the private entity. The risks like political, regulatory, institutional etc should be considered in the decision-making process since these cannot always be measured beforehand.</i> <i>Emphasis has been shifted from demand-based contracts (linked with traffic volumes) to service-based contracts such as availability, congestion, pavement/ track condition, safety etc with revenues to private parties paid on performance-</i>
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			<i>based criteria rather than traffic demand.</i>
	<i>Framework of effective PPP implementation</i>	(de Castro Silva e Neto et al., 2019; de Jong et al., 2010; Estache & Serebrisky, 2004; Fay et al., 2021; Huang et al., 2022; Ke et al., 2010; Sarmento & Renneboog, 2021; Silaghi & Sarkar, 2021; Willoughby, 2013; Zhang & Chen, 2013)	<i>A clear, unbiased, and independent regulatory framework is indispensable and essential for successful PPPs to safeguard the rights and interests of various stakeholders.</i> <i>The Land-use and Transport strategic planning, Land and property market development management, Civic consultation systems, efficient project monitoring system, progressive government policies and conducive economic regulations, pricing incentives and Public institutional framework are crucial elements for PPP projects.</i> <i>Institutional reforms are necessary for promoting and sustaining the PPPs.</i>

			<i>In the PPP procurement, the public entity's function shifts from that of a service provider to that of a regulator, therefore they must upgrade their abilities to create, negotiate, and oversee a PPP and implement a competitive and regulatory framework.</i>
	<i>Long term contracts</i>	(Cheung et al., 2009; Cruz & Marques, 2013; González-Medrano & Rotellar-García, 2023; Martins et al., 2011; Medda et al., 2013; Meunier & Quinet, 2007; Navalersuph & Charoenngam, 2021; Sarmiento & Renneboog, 2021);	<i>PPP contracts are complex. The incomplete nature of PPP agreements and unseen uncertainties involved in such long-term contracts lead to adverse selection, opportunism moral hazards and the holdup of the projects. Flexibility is required in the long-term PPP projects.</i>

The literature and scholarly articles/ papers on PPPs in railways covers various aspects of private participation in the railway projects and systems. The scope of public private participation in railways differs across the globe depending on the organizational structure, economic eco-system and extent of competition. The private participation in Railways is possible in three broad areas viz rail infrastructure projects, train operation services and other activities like parcel, cleaning and maintenance services, catering services etc. In this direction, various reorganisation/ reform initiatives are also initiated to bring more assets and services to private management and participation for PPPs in

the rail industry instead of mere outsourcing of services, catering, construction, and building maintenance. Because of this, it is challenging to investigate PPPs in railways on their own. While there is a wealth of literature on organisational and systemic reforms, restructuring, competition, and unbundling experiences and best practices, very little is known about private participation in rail infrastructure projects.

This chapter analyses the review of literature, finds research gaps, and draws conclusions for this study. The chapter covers attributes of railway system having bearing on PPPs; strategies for introducing competition into PPPs and system advantages achieved on the system that could help draw lessons for current (Port/Collieries connectivity SPVs) and future infrastructure PPPs in Indian Railways; various PPP models including those on Indian Railways and their scope; the best practices for executing PPPs for their use in railways; reviews of the selected railway PPP projects; draw inferences from the literature review; and find research gaps and formulation of the research questions for this research.

2.2 Attributes of a Railway System

Railways is a network utility, with its unique characteristics viz government ownership, sunk costs, natural monopoly, economies of scale and scope, public service responsibility etc., that make private participation in infrastructure projects more challenging and difficult (Public–Private Infrastructure Advisory Facility PPAIF- Hybrid PPPs). The following factors of Railways have a bearing on PPPs:

2.2.1 Distinct technological foundation

The railway system necessitates a specific technological foundation to supply transport services, wherein a rolling stock of specific parameters is guided by compatible rails and is different from the road where access is open to all vehicles. This causes interoperability concerns and has ramifications for PPP structure because such interoperability restricts the project scope and future extension possibilities besides limiting revenue streams.

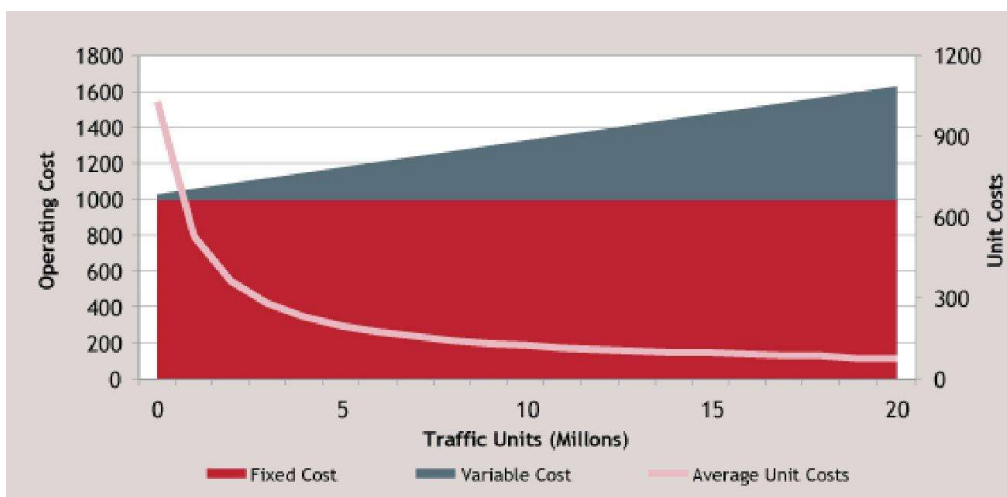
2.2.2 Natural Monopoly

The railway infrastructure projects are very capital and time-intensive ventures. Total costs are made up of a large 'fixed' component and a relatively small 'variable' component, resulting in a 'natural monopoly' (Di Pietrantonio & Pelkmans, 2004). According to World Bank research, the 'fixed' expenses in

Railway infrastructure projects account for more than 70% of total expenditures (PPAIF- Railway Reform) (Figure 2.1). These qualities make competition for infrastructure provisioning very difficult, and even if it does, it will be uneconomic and unviable due to duplication of assets (Asian Development Bank and World Bank, 2006).

Therefore, Financial measures like viability gap funding, other non-fare revenue streams are necessary in Rail Infrastructure projects to encourage private participation. A combined package of train services with other revenue stream concession can provide a definite income stream to PPP, but would need careful analysis. Channel Tunnel Rail Link (CTRL) UK which was granted as a packaged project in 1994 for the design, construction, financing, and operation of the CTRL, ran into problems a few years later and Train operations had to be separated in the revised concession agreement.

Figure 2.1: Fixed and Variable Costs in Railways



Source: *Toolkit for Improving Rail Sector Performance*. Washington: PPAIF. *Railway Reform: The World Bank*, 2011.

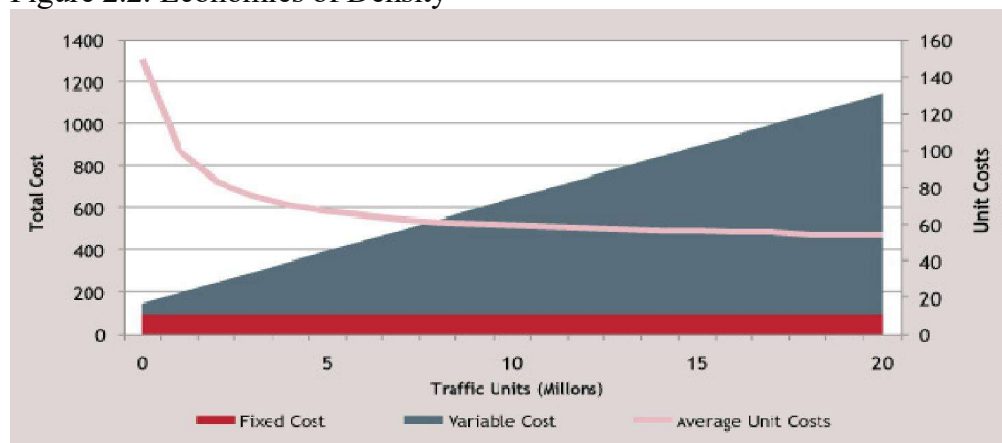
2.2.3 Economies of Size/ Density

The term economies of density refers to the reduction in the average unit costs of additional traffic moving over a fixed railway infrastructure (till capacity is reached) on railroads. (PPAIF-Railway Reform). A no. of studies show that economies of scale do not exist in railways (Kopicki & Thompson, 2013). When railways are very small, economies of scale may exist. Realising additional economies of scale becomes more difficult with railways growing in size, due to increased management convolvement and loss of quick responsiveness (PPAIF Railway Reform).

When the route kilometres of rail line remain constant, unit costs of train

services decline with an increase in output (Figure 2.2). As a result, a small firm serving only one or a few routes with high traffic density may possibly have lower average costs than a large firm running a network of lines with low traffic density and therefore the size of the firm has no bearing. (Di Pietrantonio & Pelkmans, 2004; Graham et al., 2003).

Figure 2.2: Economies of Density



Source: PPAIF. *Railway Reform: Toolkit for Improving Rail Sector Performance*. Washington: The World Bank, 2011.

2.2.4 Economies of Scope

Although a no. of studies (Marc & Gerard, 2008; Wetzel & Growitsch, 2006)) show that railways display scope economies that may derive from technical or transactional advantages of joint production, yet there is no agreement on the best structure of the railway industry. There is no agreement if separation provides more benefits and achieves greater efficiencies or if an integrated system is advantageous.

According to a study by (Merkert et al., 2012), while transaction costs are higher in Britain with vertical separation, the additional expenses resulting from separation account for merely around 1.25% of total costs. As a result, there does not appear to have been an excessive increase in transaction costs as a result of the competition that was created. Separation/ unbundling has also been accepted by (Galenson & Thompson, 1993a) as a prerequisite for private sector engagement.

Lately, it has been contended that, while duplicating rail infrastructure is generally inefficient, once the network is in place, the cost of operating rail transport services and rolling stock can be efficiently provided by multiple companies as actual/ potential competitors (UN Restructuring of Railways). Further, competition can benefit the industry by providing better services, more

options, and lower costs (Dionori et al., 2011).

After considering coordination expenses, the project size and scope must be carefully determined in a PPP project. It could also be a function of the business line, such as freight, passenger, metro, etc. According to Gomez-Ibanez, the expenses of unbundling are significant for passenger rail but reasonable for freight trains when compared to the power and telecommunications industries.

2.2.5 Public Service Obligation

Public policy aims heavily on offering rail service, urban and regional transport systems, as a low-cost transportation alternative for general public. As a result, the revenues from these services do not often cover the costs of input. Although these projects are not financially viable, yet they have significant economic and social benefits. Therefore, developing these projects under PPP route, is extremely difficult unless adequate subsidies are offered.

2.3 Critical Success Factors (CSFs) of Public-Private Partnership Infrastructure Projects

The public-private partnership (PPP) approach has increased private sector involvement in the development of large infrastructures. Although PPP in infrastructure development has proven to be a successful alternative, there have also been numerous failures, due to faulty planning/ execution/ operation. PPP involves a complicated procedure, long concession time, high-risk involvement, and collaboration amongst various stakeholders, and thus necessitates a full study of PPP crucial elements for both business and academics. PPP's role in infrastructure development has been the subject of numerous studies, with a particular focus on PPP procurement techniques (Babatunde et al., 2017), PPP issues (Macário et al., 2015), PPP risk distribution (Chou & Pramudawardhani, 2015), success factor identification in PPPs (Alinaitwe & Ayesiga, 2013), correlations amongst the critical success factors of the PPPs (Amović et al., 2020; Hai et al., 2021; Helmy et al., 2020; Ismail, 2013; Sajida & Kusumasari, 2023; Shi et al., 2016; Zheng et al., 2021) etc. Bullen & Rockart (1981) defined CSFs as the typical desired level of activity, where a positive result is required for management to achieve their objective. These factors are responsible for the success/ failure of a project. A PPP project is considered successful when the outcome is of high quality and meets the objectives, meeting community needs, government objectives, positive financial

return to private investors etc.

Many studies have been carried out for a better understanding about the success matrices of PPP initiatives across the globe. CSF are the factors that must be protected and maintained for a PPP to be sustainable and meet the goals and objectives of each stakeholder (Morledge & Owen, 1998). CSFs need to be administered properly throughout the project's lifespan to materialize the benefits of project (JEFFERIES et al., 2002). PPP involves many stakeholders with different objectives which create complications in the management.

In order to manage a PPP project effectively, it is necessary to identify the CSFs from the outset and then build a workable and effective framework that takes these aspects into consideration (Xueqing, 2005). The CSF approach has been implemented as a management tool from 1970s to various sectors, including manufacturing, commercial/ financial (Boynton & Zmud, 1984), and construction (B. Li et al., 2005; Tiong, 1996), manufacturing (Mohr & Spekman, 1994), and from the later part of the nineties to the PPP projects in various models, such as Build, Own, Operate, and Transfer (BOOT) and Build, Operate, and Transfer (BOT), among others. Yuan et al. (2009) classified fifteen KPIs for evaluating PPPs into five categories: stakeholder, physical project features, finance and commercial, invention and training, and process indicators. These indicators were used to assess a PPP project's performance based on its strengths and weaknesses.

Aje & Adeniyi, (2012) also suggested fifteen KPIs for public-private partnership infrastructure projects in Nigeria and further categorised them into three most important PIs viz cost, innovation, learning and development, and sustainability indicators.

Eshtaiwi, et al., (2017) in their study on Libyan airports PPP developed seventeen KPIs under five main performance areas viz experience of travellers, airport space, cost consciousness, safety and security, and the environment. Xueqing (2005) study of CSFs of PPP in building infrastructure projects. classified forty-seven CSFs into five categories viz. investment conducive ecosystem, prudent fiscal package, economic viability, appropriate risk allocation through stable contractual arrangements, dependable and experienced concessionaire with high engineering capabilities.

Ng et al. (2010) used the Structural Equation Modelling (SEM) approach to determine CSF under public-private partnership and classified these

into five categories namely constitutional, governmental, societal, technological, and commercial, and concluded that societal and technological factors are more pertinent in deciding the success of PPP projects. Of late PPP route has become the most accepted mode for executing infrastructure projects. Chan et al. (2010) studied CSFs in the context of public-private partnership projects in China and grouped eighteen CSFs into five classes viz steady socio-political ecosystem, prudent public administration, sound macro-economy, fair, efficient and transparent procurement mechanism, and appropriate allocation of risk and responsibilities amongst public and private sector entities.

Alinaitwe & Ayesiga, (2013) in a study of CSF for PPPs in construction projects in developing countries, first identified these from the literature, and then validated the same by interviewing the stakeholders of the construction projects, using the coefficient of variation, and concluded that strong institutions, competitive and transparent bidding process, an organized private sector and expertise in PPP projects execution are the key factors. (Liu et al., 2014) identified CSFs for the initiation, planning, procurement, and collaboration stages of infrastructure projects involving public-private partnerships and established a framework that identifies the crucial components of operational management activity in different lifespans of a public-private partnership project. In his study of CSFs for PPPs in infrastructure development in South Africa, Maseko (2014) identified project financial and technical feasibility, efficient contract administration, and a capable private entity with technical expertise as the top three crucial factors, besides creating a conducive ecosystem. Chou & Pramudawardhani (2015) determined seventeen CSFs with five key drivers namely, supportive legislative framework, commitment and accountability of stakeholders, transparent procurement process with clear roles and duties, and favourable and efficient governance as most crucial in Indonesia. Ameyaw & Chan, (2015) observed twenty-two CSFs and classified them under four categories viz economic, judicial, social and political, and technological risk factors with economical risk being the most important factor. H. Liu et al., (2016) in a study of PPP in China and Australia, found that corporate fidelity, project evaluation quality, administrative competencies, and organisation arrangements are the most important CSFs. Hsueh & Chang (2017) in their research on CSFs for public-private partnerships in Taiwan found twenty-six CSFs and divided these into four categories: i.e., conducive legal framework, supportive

investment ecosystem, proper public-private partnership project selection process, and public support. Ahmadabadi & Heravi (2019) in their analysis of CSFs on the success of public-private partnership projects concluded that while private party's expertise is crucial for project implementation during the development phase of the public-private partnership project, the competencies of government are critical for project success during the operational stage. Further, transparency in the bidding process, allocation of risk, and sound collaboration are utmost important success factors for public-private partnerships in developing nations.

2.4 Strategies for introducing competition into Public Private Partnerships

Literature refers to two approaches for introducing competition in PPPs namely, 'competition for the market' and 'competition in the market'. According to Jamison et al., (2009), competition in the utility market is implemented by the Regulators and policy makers by restructuring the sector, eliminating legal and technical obstacles to entry, precluding anti-competitive environment, and facilitating accessibility to the critical facilities. As the railway system is predominantly controlled by the government, with the exception of the United States and Canada, participation private sector in Railways began with the reforms in industry besides unbundling and restructuring of railway industries. In Europe, it evolved on the concept of market competitiveness, with the removal of entrance obstacles and regulation of access pricing through vertical separation in train services (Profillidis, 2001). Vertically integrated private railways (horizontal separation) evolved in Japan, Argentina, and Mexico on the concept of 'competition for the market.' UK and Japan followed privatization model. Mizutani, (2004) observed for Japan that the total costs are more in public railways than the private railways. A large no. of countries are following public-owned vertically integrated PPP models with limited third-party participation of private sector.

2.4.1 Vertical Separation

This methodology is known as 'competition in the market wherein Infrastructure and train operations are separated through vertical separation. It was first implemented in Sweden and later extended to other European countries following a European Union Directive. In this model, while the infrastructure service is handled by public sector, train operations services are provided by

multiple public and private firms in a competitive environment (Gouvelal & Daydou, 2005; Hafner, 1996). Generally, an independent economic regulator ensures open access competition for operators and minimizes entry barriers besides regulating the track access charges payable by the operators. Though vertical separation brings competition, some studies show that it is not suitable for the railway industry as transaction cost increases by 20-40% in vertical separation as compared to vertically integrated system (Pittman, 2009).

2.4.2 Horizontal Separation

Horizontal separation approach is known as 'competition for the market' and is adopted in Mexico, Argentina, Brazil, and Japan, competition may be instituted by geographical division, wherein within an area, one firm is made responsible for both infrastructure and railway services and/or different firms provide goods and passengers services. It is deemed beneficial when considerable economies of scope exist between related operations as well as between railway and non-railway industries (Mizutani, 2004).

2.4.3 Vertical and Horizontal Separation

In Netherlands infrastructure and train operations are separated, and train operations are divided into national, regional, and freight services. If the services are mutually exclusive, there are advantages and disadvantages.

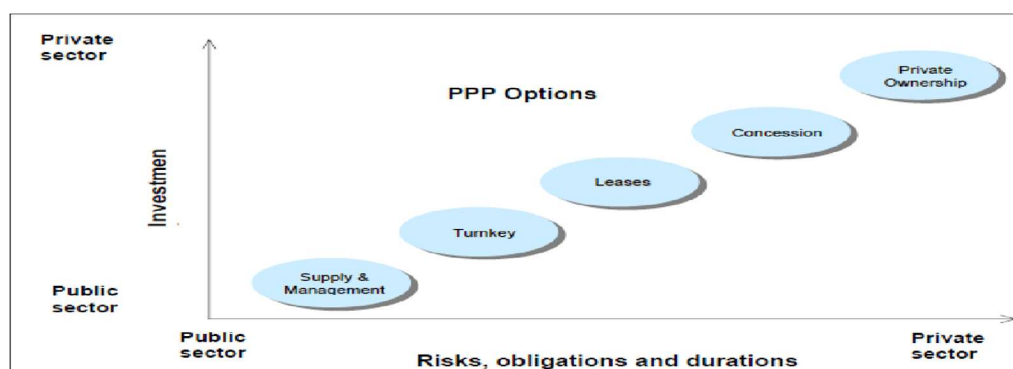
2.4.4 Third Party Access

Many studies show that third-party access in a vertically integrated system is more appropriate for railways (Pittman, 2009). IR's initiative to allow competition in the container sector is an example of this category. However, entry barriers, lack of transparency and a level playing field for stakeholders may create problems (OECD, 2010).

2.5 PPP Models

Public Private Partnership is a generic term used to describe a variety of arrangements between public and private sectors (ADB, 2008; Bennett et al., 1999) and there is no single definition or model thereof. However essential features of all these models are (i) public responsibility (ii) provision of public infrastructure/services or both, (iii) substantial risk sharing by the private sector, (iv) emphasis on service delivery and not mere asset creation, (v) performance linked revenue sharing, (vi) specified tenor (Macário et al., 2015; United Nations, 2011). Figure 2.4 gives a range of possibilities for private sector participation:

Figure 2.3: Basic Features of PPP Models



Source: (United Nations, 2011)

These categories may have various variants depending upon the rights and responsibility over assets, assumption of risks, and tenor of concession agreement (Table 2.1). Long-term concessions, with defined project scope bundling the tasks to be delivered by private parties, are becoming a preferred form of PPPs. The handbooks on PPPs published by ADB, UN, World Bank and multinational agencies describe these in detail. However, more and more PPPs are now coming up with a hybrid model adopting a combination of variants to best suit the local requirements (ADB Public Private Partnership Handbook; UN Guidebook on PPPs; EC Guidelines for Successful PPPs). There can be different PPP approaches, but there can be no single generic or ‘best’ model of PPP structure (Source: EU Guidelines for Successful PPPs).

Table 2.2: Classification of PPP Models

Broad Category	Main Variants	Ownership of capital	Responsibility of Investment	Assumption of risk	Duration of Contract (years)
Supply and management contract	Outsourcing	Public	Public	Public	1-3
	Maintenance management	Public	Public/Private	Private/Public	3-5
	Operational management	Public	Public	Public	3-5
Turnkey		Public	Public	Private/Public	1-3
Affermage/lease	Affermage	Public	Public	Private/Public	5-20
	Lease*	Public	Public	Private/Public	5-20
Concessions	Franchise	Public/Private	Private/Public	Private/Public	03-10
	BOT**	Public/Public	Private/Public	Private/Public	15-30
Private ownership of assets and PFI Type	BOO/DBFC	Private	Private	Private	Indefinite
	PFI***	Private/Public	Private	Private/Public	10-20
	Divestiture	Private	Private	Private	Indefinite

*Built-Lease-Transfer (BLT) is a variant.

Source: (United Nations, 2011)

The common PPP models are Build, Operate, and Transfer (BOT), Build, Operate, Lease, and Transfer (BOLT), Build, Operate, Own, and Transfer (BOOT), Design, Build (DB), Design, Build, Finance, and Maintain (DBFM), Design, Build, Finance, Maintain, and Operate (DBFMO) etc. The broad features of these models are described in the table below:

Table 2.3: Project Components

	Own	Conceive	Design	Build	Operation & Maintenance	Financial Responsibility
Design-Bid-Build	Public	Public	Private by fee contract		Public	Public
Design—Build	Public	Public	Private by fee contract		Public	Public
Build-Operate Transfer (BOT)	Public	Public	Private by fee contract			Public
Design-Build-Finance-Operate (DBFO)	Public	Public or private	Private by fee contract			Public. Public/Private. or Private
Burd-Own-Operate (BOO)	Private	Public or private	Private by fee contract (Concession)			

Source: United States Department of Transportation. Federal Highway Administration. Available: www.fhwa.dot.gov/ppp/options.htm and ADB. Public Private Partnership Handbook. Philippines: Asian Development Bank, 2006.

The railway sector PPPs also are formed with similar arrangements of designing, building, financing, operating, maintaining, and transferring components of railway infrastructure viz track, signalling, controls systems, traction power supplies, civil engineering structures, stations, depots, trains, and commercial property and revenue sharing through apportionment of freight & fares, track access charges, license/ rentals etc.

2.6 Best Practices in PPPs

Almost all studies show that properly designed and executed PPPs are capable to deliver 1) better service quality, 2) lesser project costs, 3) risk division, 4) faster and timely construction saving time/ cost over-runs, 5) better budgeting and financing, and 6) optimal life cycle costs (Alexandersson & Hultén, 2007; Bernardino et al., 2010; Dhingra & Sharma, 2022; Dutzik et al., 2011; Geest & Núñez-Ferrer, 2011). However, designing, implementation, and management of these PPPs is a complex process (EC Guidelines for Successful PPPs). Setting up PPPs for large infrastructure projects is complex and mistakes in their development can lead to higher costs than normal procurement (Geest & Núñez-Ferrer, 2011) and may also sometimes go wrong, creating inefficient, under-used and loss-making transportation systems (Alexandersson & Hultén, 2009). The complex PPP structure of London Underground PPP was one of the main reasons for its failure (Williams, 2010). Therefore, knowledge of and expertise in different approaches to structure PPP arrangements must be enhanced in order to reap benefits of PPP (EU Guidelines for Successful PPPs).

The overall success of a PPP project depends on support and commitment

from every stakeholder. Both financial returns and economic and social benefits are success parameters for PPPs. The project should be completed on time and within the budget. The following broad principles are necessary to create a conducive environment for PPPs:

2.6.1 Sector Diagnostic

There is no proven universal model for successful PPP in one or across the sector sectors. A realistic assessment of strength, weakness, opportunities, limitations specific to that sector viz legal, technical issues, regulatory and policy frameworks, institutional and capacity status, financial, commercial, and economic issues is essential (ADB Public Private Partnership Handbook). Probably this is one of the reasons that PPPs are not taking off in railways though many highways under PPP have come up in India. A proper analysis of rail sector, opportunities to improve its competitiveness, threats to its competitiveness and sustainability, followed by identifying areas where private sector could add value is required.

2.6.2 Clear Objectives

PPP is a relationship amongst many stakeholders with different objectives and thus differences are required to be identified, understood, and integrated into the project to make PPPs successful. Case studies show that the public sector often are mostly lacking in this area (Alexandersson & Hultén, 2009); EC Resource Book on PPP Case Studies). Collaboration with stakeholders at earliest stage of PPPs may provide clarity on their expectations and bring synergy to the project. Further, PPPs should not be formed only for budgetary resources, as has been the case in the past in IR and should aim at achieving value for money as the main criterion in judging the merit of a PPP option. PPPs should be developed as part of the coherent strategy for the sector.

2.6.3 Efficiency Gains

The crux of a PPP for Government is to leverage the efficiency of private sector and buy quality services from the private sector instead of the assets, as governments generally lack quality service due to bureaucratic procedures (ADB Public Private Partnership Handbook). This forms an important acid test for PPP structuring and a project must be considered as a PPP only if the efficiency gains from improved project delivery, operations and management, and access to advanced technology offsets the additional costs on account of borrowing, transaction, and administration of PPP projects.

2.6.4 Institutional Reforms

Institutional reforms are necessary for promoting and sustaining PPPs. Since the role of the public authority changes from the service provider to regulator in a PPP procurement, they must upscale their skills to design, negotiate, and manage a PPP and put in place an effective regulatory and competition policy (Estache et al., 2007; Estache & Serebrisky, 2004). A mere change in operation and management control of an infrastructure PPP may not be sufficient to increase its economic operation unless appropriate sector and market reforms are made (UN Guidebook on PPPs).

2.6.5 Flexibility in long-term Contracts

The PPP projects are long-term projects and involve long-term concession agreements. The eventualities that can come across during the concession period cannot be foreseen and various studies show that there should be flexibility in the contractual and revenue provisions, to ensure that objectives of all parties are met and that differences can be resolved to the benefit of the project including adjustment in revenue flows to address changing demand realities (ADB, 2008; Alexandersson & Hultén, 2009).

In recent years the emphasis has been shifted from demand-based contracts (linked with traffic volumes) to service base contracts such as availability, congestion, pavement/ track condition, safety etc and revenues to private parties are dependent upon performance-based criteria rather than traffic demand (Harding et al., 2010).

Public-private partnership in high-speed railway infrastructures-Elements for Improvement; suggested separate agreement for signalling and communications systems, cross-border collaboration for international sections, provision of risk transfer to the private party, responsibility of preservation of stations in the existing rail network and maintaining the interface between the new infrastructure and the existing network, fair rolling stock procurement process, reduction in travel time, and provision of the maintenance activities in the PPP contract (González-Medrano & Rotellar-García, 2023).

2.6.6 Appropriate Risk Transfer

PPPs are subject to various risks associated with construction, finance, revenue, availability, inter-party, quality standards, political and regulatory etc. For successful PPP, it is necessary that all these risks are identified and allocated

to the party that can manage it more appropriately (Alexandersson & Hultén, 2009; Khasnabis et al., 2010). For instance, the regulatory risk is better suited for the public sector and construction, availability and quality standard risks for the private sector. Certain risks viz political, regulatory, institutional etc should be included in the decision-making process as they cannot always be quantified beforehand (Smith & Gannon, 2008). Additional costs are unavoidable when too much risk is transferred to the private party (EC Resource Book on PPP Case Studies). There is a need for the Government to focus more on minimizing risk than to allocate risks (Leijten & Koppenjan, 2010).

2.6.7 Life Cycle Approach

In long-term PPPs, the operation and maintenance costs associated with the capital assets may outweigh the initial investment several times over the project life. Therefore, it is necessary to adopt the life cycle cost (LCC) approach encompassing procurement, operation and maintenance, renewal, scrap and recycling costs and course of action with the lowest LCC should be chosen (Zoeteman, 2008). In a rail PPP, train capacity should also be considered for evaluating cost-effectiveness (UIC, 2010). LCC approach provides for minimize costs over the life of a project through efficient operational and maintenance service provisions, which is difficult to achieve under traditional public sector (European Commission, 2003; Horchner, 1999). Viegas (2010) has argued that multiple contracts of shorter life cycles could be considered in PPP instead of a single contract that provides full amortization of infrastructure, and each partner receives the amortized part at the end of the contract.

2.6.8 Competition

Lack of adequate competition can turn PPP into a private monopoly with inefficiencies like state PPPs should capitalize on the advantages of competition. However, both excessively restricting concessions as well as establishing too many concessions, can deprive PPP of benefits. If the government regulation is overly strict and narrow, it can affect service provision adversely and if it is excessively moderate, it may not be able to hold private service providers sufficiently accountable (Rondinelli, 2004).

2.6.9 Independent regulatory framework

A clear, unbiased, and independent regulatory framework is essential to protect the rights and interests of various stakeholders for successful PPPs. According to Meunier & Quinet, (2010), the regulatory regime takes several

forms depending on the type of competition and may be ensured through a Competition Authority, a Public Administration, or an Independent Body. Six areas that need to be regulated in a PPP are licensing, safety and security, pricing, service levels, environment, and dispute resolution (Pangotra & Raghuram, 1995), which could be managed through a separate framework for each of them viz. pricing/economic regulation can be contract, cost plus or price cap etc.

2.6.10 Expertise in PPPs

Lack of expertise is one of the hindrances in PPPs which not only restricts PPP formation but also holds back efficiency gains in PPPs (Koppenjan & Leijten, 2005). Eurotunnel project failed as the concessionaire lacked the management capability to handle a project of such magnitude. In port connectivity projects in Indian Railways also, SPVs did not have contractors with required calibre outside railways to handle EPC (engineering, procurement, and construction) and had to subcontract the work to railways. This calls for developing expertise in various domains of PPP development and implementation.

2.6.11 Political consistency

PPPs involve large investments and long-term concessions, and it is not always possible that circumstances remain the same over the concession period and no unforeseen problems arise. Further, planning, designing, approving, and building a PPP is a long-drawn process. Therefore, consistency in Government policies and support for PPP and a practical approach to modifying PPP arrangements to suit the changing circumstances/ problems is very important. A clear government policy and scrupulous implementation thereof are a must for transport infrastructure planning (Walters & Pisa, 2023)

2.7 Railway Public-Private Partnerships

The previous sections have covered different PPP models, governing principles and broader requirements for PPP partnerships, which are equally applicable to the railway sector with little tweaks to cater for the sectoral requirements viz technology base, higher costs, public service obligation etc. In addition, to these general challenges, the following sector-specific challenges have been identified in rail sector PPP studies:

2.7.1 Demand assessment

Assessment of demand for rail projects is more difficult than that for road and air travel as a result, overestimations of revenues are very common in

railway PPP projects (Cairns, 2004).

Table 2.4: Traffic (Actual Vs Forecast)

Project	V. forecast	Year (Years of operation)
Artanda Express	-25%	2005 (6)
Ortyval	-71%	1992 (1)
	-55%	2000 (9)
Seoul ARE-X	-70%	2011 (4)
Kuala Lumpur ERL	-80%	2003 (2)
	-65%	2010 (9)
Brisbane AirTrain	-88%	2001 (1)
	-68%	2010 (10)
Sydney ARL	-66%	2005 (6)
Eurotunnel	-63%	2003 (9)
Delhi ARL	-53%	2011 (1)
Taiwan HSR	-55%	2010 (7)

Source: (Dehornoy, 2012)

As can be seen, there was an overestimation in 9 out of 10 rail projects as against 5 out of 10 in toll roads. The ridership shortfall was as high as 88% in some cases. The delays in decision-making, clearances etc in the pre-construction phase cause more cost overrun in a PPP than in the construction phase (Cantarelli et al., 2012). Rail fares are highly susceptible to public policy decisions as a result of which railways in general are not able to cover their total costs, and many do not even cover their operating costs through fare box revenues. The rail sector is thus prone to higher political risks.

2.7.2 Activities/ assets under PPP in railways

The private participation started in the Railways with non-core areas viz track maintenance, catering, parcel, coach cleaning etc to the private sector before implementation of PPP. (Galenson & Thompson, 1993a) preferred the allocation of specific tasks by unbundling, to private sector having regard to the complexity of railway system. Based on criticality, (Mathur, 2010) classified the railway-related activities into seven broad categories and suggested that highly technical and critical services viz signalling/ system operation and track/system design may take more time for PPPs (Figure 2.4).

Figure 2.4: Criticality of Services



Source: (Mathur, 2010)

The studies have revealed that less critical services e.g. track maintenance, catering, parcel, coach cleaning etc have been assigned to the private sector in many railways as they perform better than the public sector in such areas. For example, Japanese Shinkansen bullet train right-of-way is maintained by the private sector, which costs less than the maintenance done on Japan National Railways conventional lines. In several railways in USA, locomotive maintenance is done by private contractors as it costs less than that done by the railway themselves. However, for the success of PPPs in the rail sector expansion of more assets and services to private participation and management is necessary and mere outsourcing of services, catering, construction, and building maintenance will not increase private participation (Galenson & Thompson, 1993).

Five different scenarios for rail PPPs viz train availability, train availability and operations, infrastructure construction, infrastructure construction and operations, and integrated concession along with responsible authority have been suggested by Bullock based on the project scope:

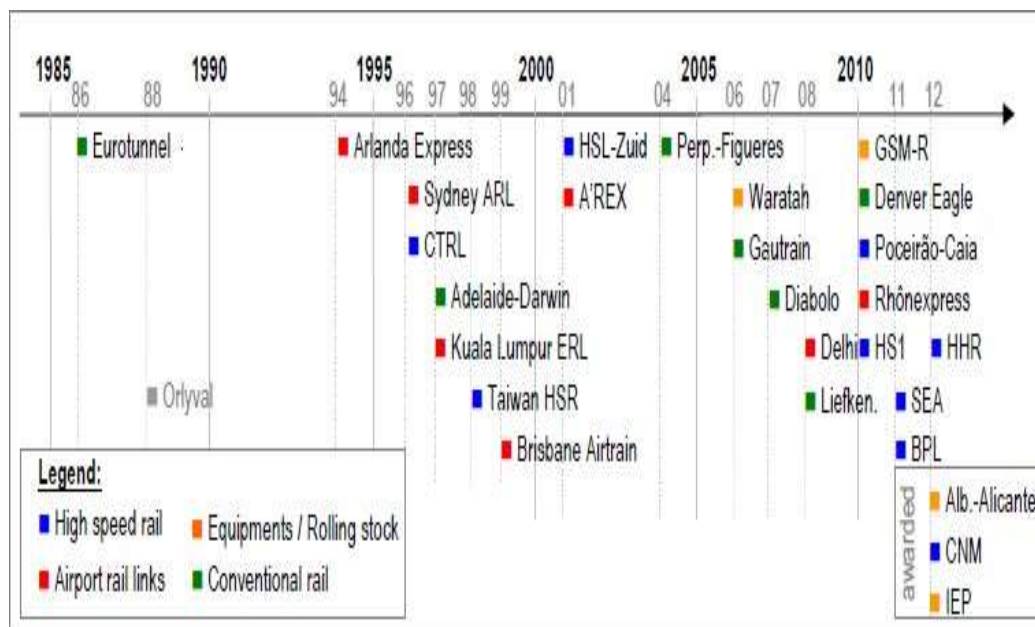
Table 2.5: Possible PPP Models for Railways

	Finance and build rail line	Operate and maintain rail line	Finance and maintain trains	Operate train services
Train availability contract	Public	Public	Private	Public/ private (hire payments to private entity)
Train operating concession	Public	Public	Private	Private (pay access charges to public entity)
Infrastructure build concession	Private	Public/ private (lease payments to private entity)	Public/ private	Public/ private
Infrastructure build & operate concession	Private	Private	Public/ private (pay access charges to private entity)	Public/ private
Integrated concession	Private	Private	Private	Private

The first major Railway project with private participation was Eurotunnel in 1986 to build the infrastructure and operate trains. It was entirely financed by the private sector. Research reveals that though this project was technically a success, it was financially not successful. Therefore, not much happened in the next ten years after Eurotunnel. However, taking lessons from

it gradually new projects were taken up with private participation and 27 projects were taken up (16 in Europe) until 2012 (Dehornoy, 2012). These included airport rail links (7 PPP), high-speed lines (9 PPPs), equipment/ rolling stock (4 PPPs) and conventional lines (7 PPPs) (Table 2.6)

Table 2.6: List of 27 Rail PPPs



Source: (Dehornoy, 2012)

Hansen (2011) also reviewed 15 railway PPPs (Table 2.7) which shows that the profile of projects varies significantly in terms of size, concession period, capital investment and project scope. Projects with integrated concessions bear the demand risk.

Table 2.7: Major Railway PPPs

	Design & Construction period	Concession period [years]	Route length [km]	Investment costs	public funds	Contract
Channel tunnel rail link	1996-2003/2007	90	109	Pound 5.8 bn	Pound 2010	DBFM
ACTRL Oresund road-rail link	1991-2000	25-30	38	€2bn	100% state Guarantee	DBFM
HSL-Zuid	2000-2007	25	100	€6bn	€ 110m/year	DBFM
Amsterdam-Belg. Alice Springs-Darwin rail	2000-2004			A\$1.2bn	A\$ 559 m	DBOFM
Tapei-Kaohsiung HS rail	2000-2007	35	335	US\$ 18bn		DBOFM
Perppnan-Figueras HS rail	2005-2009	50	45	€1.1bn	€540m +62m	DBFM
Diabolo rail link	2007-2012	35	3	€ 540 m	€ 250m track& sig.	DBF
Brussels Lietkenshoek rail link Antwerp	2008-2013	38	16	€840m	€50m/year	DBFM
Tours-Bordeatr•	2010-2016	44	340	€7.2bn	< 50%	DBFM

HS rail GSM•R Network France	2009-2015	15	14000	€1bn	€160m	DBOFM
Lisbon-Madrid HS rail	2009-2013	40	>165	€7.8bn		DBFM
Nimes-Montpell. KS rail	2011-2016		80	€1.62bn		DBFM
Brittany-Pays de la Loire HS rail	2011-		182	€2.85bn		DBFM
Rio de Jan.-Sao P-Campinas HS rail	2011-2017			\$18.7bn		DBOF
Kokkola-Yivieska rail link	2011-2014	20-30	76 2nd Track	€660m		DBFM

Source: Hansen (2011)

The study by Ernst & Young (International Case Studies on Delivery and Financing, 2009), examined the roles played by the public and private sectors for 11 high-speed railway projects and shows increasing involvement of the private sector (Table 2.8).

Table 2.8: Increasing involvement of private sector in railways

		Germany	Spain	France	Italy	UK	Portugal	France	Netherlands	12z	Japan	Taiwan
		ICE	AVE	TGV (Original)	TAV	HS1 Post Restructuring	RAVE	TGV (Partnership Contract)	HSL Zuid	TGV (Concession)	Shinkansen	Taiwanese HSR
Specification		State	State	State	State	State	State	State	State	State	State	State
Substructure	Design, Build	Deutsche Bahn (DB)	ADIF	RFF	RFI	NR/HS1	PPP	PPP	State	Concessionaire	N/A	THSRC
	Operate, Maintain								PPP			
Super Structure	Design, Build		RENFE	SNCF	NTV Trenitalia	LCR	CP	SNCF	PPP			
	Operate, Maintain								State			
Rolling Stock	Supply		DB	RENFE	SNCF	Trenitalia	LCR	REFER	SNCF	State	SNCF	N/A
	Maintain									NS		
Operation		DB	RENFE	SNCF	Trenitalia	LCR	REFER	SNCF	PPP	SNCF	N/A	TSC
Financing	A mix of options involving private sector funding, bank debit and capital market financing raised directly by the project vehicle or IM with strong public support											

Source: Ernst & Young. "International Case Studies on Delivery and Financing." Presentation. 18 December 2009

The following trends and facts emerge from the above analysis:

(i) 'Asset Only' Concessions

The majority of the infrastructure projects are under the Design, Build, Finance and Maintain (DBFM) model and unlike other sectors 'Operate' is not a standard feature of rail PPPs. Dehornoy (2012) study reveals that rail PPPs are moving to asset-only concessions from integrated concessions for various reasons viz competition, efficiency, transparency, risks, costs etc. (Table 2.9).

Table 2.9: Integrated vs Asset-only PPPs

	Integrated	Asset-only	Total
1985-2005	9	2	11
2005-2012	4	12	16

Source: (Dehornoy, 2012).

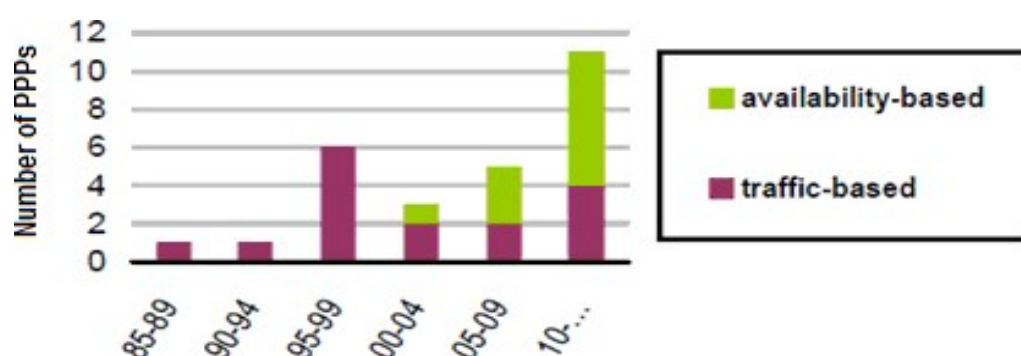
As per Hansen (2011), segregation of infrastructure and train operations can reduce the overall costs and risks by encouraging increased competition and

higher contract flexibility.

(ii) Revenue risk mitigation

Traffic-related risks are inherent in Rail PPPs. Of late rail PPPs are moving from traditional traffic-based concessions to availability-based concessions to address revenue risks (Figure 2.6). The revenue source for the concessionaire is the fare box collection in traffic-based concessions. In such arrangements the revenue risks are very high for concessionaires since demand estimations in general are over-estimated in DPR and fare structures are influenced by socio-political considerations. Several PPPs viz CTRL, Taiwan HSR, Seoul airport link, and Sydney airport link, where the demand risk was transferred to the private party had to be eventually supported by the government. Under availability-based concessions revenue or traffic risk is borne by the public authority. The demand risk is not posed on the concessionaire, and they are compensated for an achieved level of service during the operating years (Chou et al., 2012; Dehornoy, 2012).

Figure 2.5: Availability Based vs Traffic Based Concessions



Source: (Dehornoy, 2012).

As per (Caetano Roos et al., 2024) a better understanding of risk identification and regulatory processes in concession projects in transport infrastructure is necessary for the success of PPP.

(iii) With Public Subsidy

Most of the studies show that an infrastructure rail PPP (with or without train operations) would not be able to recover capital investments only through fare-box revenues and would require government subsidies at times totalling more than 50% of the project cost (Dehornoy, 2012). Another study by Phang (2007) also revealed that fare box revenues are insufficient to fully compensate for private infrastructure investments and must be addressed effectively in the PPP structure. For this PPP policy should provide for direct subsidy, awarding an annuity, or combining the project with positive externalities like land

development etc.

2.8 Theoretical Underpinning:

(i) Contract Theory:

(ii) Stakeholders Theory:

(iii) Agency Theory

2.8.1 Contract Theory

Contract theory is an important framework that can inform the design of a sustainable Public-Private Partnership (PPP) model for Indian Railways (IR) infrastructure. Contract theory focuses on how parties can design agreements to mitigate risks, align incentives, and ensure efficient outcomes in situations where there is uncertainty or incomplete information. In the context of PPPs, contract theory helps in structuring agreements between the public sector (government) and private sector (investors, developers, operators) to deliver infrastructure projects effectively and sustainably.

Contract theory examines how people and entities construct and develop legal agreements. It also analyses how the stakeholders with varied interests design formal and informal contracts. The theory also employs the principles of financial and economic behaviour since different stakeholders have different incentives to undertake or not undertake particular actions.

In contract theory within microeconomics, it is common to use numerical utility structures to depict a decision maker's behaviour and then employ optimization algorithms to find the best decisions. This approach has been applied to various typical scenarios in contract theory, such as adverse selection, moral hazard, and signalling. These models aim to theoretically incentivize agents to take the right actions, even. The key accomplishments of these models inter-alia include analysing the mathematical properties of the principal and agent's utility structures, relaxing assumptions, and adjusting the time structure of the contract relationship, among other factors. It is standard practice to view individuals as maximisers.

Design contracts for multiple employees: One of the most widely accepted approaches available to employers in practical economics is designing contracts for multiple employees at the same time by taking absolute performance-related incentives into consideration.

Other forms of absolute rewards include grouping employees and rewarding the entire group based on each group's overall performance. However, in such a

scheme, both performers as well as non-performers in the group may receive rewards. It is thus preferable to set the mechanism that ensures appropriate rewards to better performers.

In exploring an ideal sustainable PPP model for Indian Railways infrastructure using contract theory, several key considerations come into play, which are as follows:

Allocation of Risks: Contract theory emphasizes the importance of allocating risks between participants based on their capability to manage and control them effectively. In the case of IR infrastructure projects, risks of construction time overruns, cost overruns, revenue fluctuations, and operational disruptions need to be carefully identified and allocated to the party best equipped to handle them. For example, construction risks may be borne by private investors, while revenue risks may be shared between the public entity and private operators.

Incentive Alignment: Contracts should align the incentives of all participating entities involved in the PPP model. This encourages efficient project delivery and operation. For instance, performance-based payment mechanisms can incentivize private operators to maintain high service quality and operational efficiency, leading to better outcomes for passengers and the public.

Flexibility and Adaptability: Contract theory emphasizes the importance of flexibility and adaptability in contractual arrangements, especially in long-term infrastructure projects like railways. Contracts should allow for adjustments to be made in response to changing circumstances, such as shifts in demand patterns, technological advancements, or regulatory changes. This ensures that the PPP model remains resilient and sustainable over time.

Transparency and Information Sharing: Effective communication and information sharing between parties are essential for successful PPPs. Contracts should include provisions for transparent reporting, monitoring, and evaluation of project performance, as well as mechanisms for resolving disputes and conflicts that may arise during the project lifecycle.

Value for Money: Contract theory helps in ensuring that PPP projects deliver value for money for both the public sector and private investors. This involves optimizing the allocation of resources, minimizing transaction costs, and maximizing the long-term benefits generated by the infrastructure investment.

Legal and Regulatory Framework: Contract theory underscores the importance of a clear legal and regulatory framework to govern PPP

arrangements. This includes defining each party's rights, obligations, and responsibilities and establishing mechanisms for contract enforcement and dispute resolution.

By applying insights from contract theory, Indian Railways can design PPP models that promote sustainability, efficiency, and accountability in the development and operation of railway infrastructure, benefiting passengers, taxpayers, and the wider economy.

2.8.2 Stakeholder Theory (ST):

Stakeholder theory is a framework used in business and management that suggests organizations should consider the interests of all stakeholders, not just shareholders when making decisions. This includes employees, customers, suppliers, local communities, and other groups affected by the organization's actions. In the context of sustainable development, stakeholder theory encourages businesses to adopt practices that benefit not only their bottom line but also society and the environment.

R. Edward Freeman is often credited as the "father of stakeholder theory" in a plethora of books and articles on the subject (Freeman et al., 2010). Freeman's *Strategic Management: A Stakeholder Approach* is widely cited in the field as being the foundation of stakeholder theory, although Freeman himself credits several bodies of literature in the development of his approach, including strategic management, corporate planning, systems theory, organization theory, and corporate social responsibility. A related field of research examines the concept of stakeholders and stakeholder salience or the importance of various stakeholder groups to a specific firm. Freeman started the debate around stakeholder theory, where he said that it is based on the fundamental principle that "the firm takes into account all of those groups and individuals that can affect or are affected by, the accomplishment of organizational purpose".

The stakeholder theory is often regarded as the theory of organizational management and business ethics which addresses morals and values in managing an organization. In the traditional view of a company, the shareholder view, only the owners or shareholders (stockholders) of the company are important, and the company has a binding fiduciary duty to put their needs first, to increase value for them. Stakeholder theory instead argues that there are other parties involved, including employees, customers, suppliers, financiers, communities, governmental bodies, political groups, trade associations, and trade unions. Even

competitors are sometimes counted as stakeholders – their status is derived from their capacity to affect the firm and its stakeholders.

Defining the stakeholder idea and categorizing stakeholders into groups that help comprehend the relationships between specific stakeholders have been the two main areas of focus for the development of stakeholder theory.

As stakeholder theory has developed in recent years, it has started to draw attention to the significance of the connections that businesses have with stakeholders, connections that extend far beyond those that the companies inherently have with their shareholders.

However, the stakeholder theory necessitates not just a comprehension of the many forms of stakeholder influence, but also a knowledge of how the enterprises operate in response to those influences. (Donaldson & Preston, 1995) described three main categories to explain stakeholder engagement viz normative (should have), descriptive (how it is), and instrumental (conductive). In research, the descriptive technique is used to characterize and explain the traits and actions of firms, such as the management style, the nature of the firm, the way the board of directors' views corporate stakeholders, and the way managers think about managing.

The instrumental technique makes use of empirical data to determine the relationships between stakeholder group management and the accomplishment of corporate objectives, mostly the productivity and profitability goals. Donaldson and Preston have highlighted the normative approach as the essential component of their theory, which analyses the role of the business firm and determines the ethical or philosophical principles for the operation and management of the firm.

But this version of the theory did not offer guidance on how the appropriate individuals or groups should be selected. Even if they are identified, the definition of benefits and degree of balancing was not clear. How the balance is to be struck, are stakeholders' interests equal, important and also do not provide guidance on the conflicting interests of stakeholders.

Mitchell et al. (1997) propounded a theory of stakeholder identification and salience in 1997 using descriptive and normative components, focussing upon three key variables viz, urgency, power, and legitimacy. Subsequently, (Kaler, 2004) presented a typology of stakeholder theories based on the extent to which

serving the interests of non-shareholders relative to those of shareholders is accepted as a responsibility of companies.

In addition to adding a socio-political dimension, the stakeholder view of strategy merges the resource and market-based perspectives. The normative theory of stakeholder identification is a popular approach to stakeholder theory that aims to identify the precise stakeholders of a corporation and analyses the circumstances under which managers view them as stakeholders (the descriptive theory of stakeholder salience).

Certain authors have viewed that stakeholders need to be categorized as primary or secondary stakeholders. According to Frederick et al. (1992), primary stakeholders are those stakeholders who have an impact on or are connected to the main business functions, and as such, are crucial to the organization's existence (Clarkson, 1995). As per Clarkson (1995), the secondary stakeholders, on the other hand, are less crucial to the business's survival and they are involved in secondary or support functions of firm (Frederick et al., 1992). Therefore, while the primary stakeholders comprise the shareholders, customers, suppliers, employees, etc., the special interest groups, are usually considered secondary stakeholders (Clarkson, 1995).

Mitchell et al., 1997 develop a typology of stakeholders based on the characteristics of power i.e., the degree to which a stakeholder can enforce its will in a relationship; legitimacy comprising socially recognized and expected structures; and urgency covering sensitivity of time or criticality of the investor's claims. Eight types of stakeholders and their implications for the organization have been derived by looking at these features together, in a binary fashion. Friedman and Miles, by including additional attributes of compatible or incompatible interests; and necessary or contingent connections, evaluated the configuration of interactions and ramifications of relationships between stakeholders and organizations.

Robert Allen Phillips makes a distinction between the normatively legitimate stakeholders for whom the firm owes a moral obligation and the derivatively legitimate stakeholders, who can affect the firm or its normatively legitimate stakeholders.

Stakeholder Theory was questioned on the accountability front since it says the firm is accountable to all stakeholders which diffuses the accountability. Another view was that it undermines private property rights. It is a dynamic and evolving

field, and more papers talk about how corporate social performance can be linked with corporate financial performance using this theory. It also indicates the need for more research into the rationales, which the firms should adopt while interacting with the stakeholders to attain organisational goals, and the relation between adopting “strategic CSR” and managing community to preclude community conflict.

Applying stakeholder theory to explore an ideal sustainable Public-Private Partnership (PPP) model for Indian Railways (IR) infrastructure involves consideration of the interests and concerns of all stakeholders involved in the railway sector infrastructure projects. This could include passengers, government agencies, railway employees, local communities living near railway lines, environmental groups, and private investors. An ideal sustainable PPP model for Indian Railways infrastructure would likely involve:

Government Involvement: The government play a crucial role in setting policies, regulations, and standards to ensure the sustainability and social responsibility of the railway system. This could include environmental regulations, safety standards, and requirements for fair labour practices.

Private Sector Participation: Private companies would invest in and manage certain aspects of the railway infrastructure, such as building new lines, upgrading existing infrastructure, or providing ancillary services like station management and logistics if interests aligned.

Community Engagement: Local communities living near railway lines would be consulted and involved in decision-making processes to address their concerns regarding noise pollution, land use, and other potential negative impacts of railway infrastructure.

Environmental Sustainability: The PPP model would prioritize environmental sustainability by promoting energy-efficient technologies, reducing greenhouse gas emissions, minimizing habitat destruction, and implementing measures to mitigate the environmental impact of railway operations.

Social Responsibility: The PPP model would prioritize the welfare of the employees, ensuring fair remuneration, safe working conditions, and opportunities for professional skill development. It would also aim to provide affordable and accessible transportation services for all segments of society.

Financial Viability: The PPP model to be financially sustainable, providing a fair return on investment for private investors while ensuring affordable ticket prices for passengers and minimizing the burden on government finances.

Long-Term Planning: The PPP model would involve long-term planning and investment strategies to ensure the railway system's resilience and adaptability to future challenges such as urban development, climate change, and technological advancements.

By incorporating stakeholder perspectives and principles of sustainability into the design and implementation of the PPP model, Indian Railways can achieve its goals of modernization, efficiency, and inclusivity while minimizing negative impacts on society and the environment.

2.8.3 Agency theory:

Agency Theory is also relevant in the context of Public-Private Partnership (PPP) projects, especially in complex sectors like railways infrastructure, where the relationships between stakeholders—government, private entities, and end-users—are critical. It looks at how the principal and agents interact and serves as a framework for comprehending and resolving conflicts of interest between important stakeholders.

Principal-Agent Relationship: The government or public authority commissioning the railway project is principal, the private sector entity (concessionaire, contractor, or operator) responsible for design, construction, operation, and maintenance is agent.

Challenges: The challenges in PPP are (i) Asymmetric information e.g., the agent may have more technical knowledge than the principal, leading to information imbalances, and (ii) Divergent objectives: i.e, the government prioritizes public welfare and long-term sustainability, while the private partner focuses on profit maximization.

Key Issues Addressed by Agency Theory:

Moral Hazard: Private entities might cut corners in quality or inflate costs if monitoring is insufficient, for instance, substandard construction materials used by agent leading to safety risks or delayed timelines.

Adverse Selection: Selection of private partners who might lack adequate expertise, misrepresenting their capacity during the bidding process.

Goal Misalignment: Government might aim for affordable transportation for the masses, whereas the private partner seeks higher tariffs or ancillary revenues.

Mechanisms to Mitigate Agency Problems in PPPs:

Performance-based Contracts: Clear deliverables, timelines, and penalties for non-performance. For example, imposition of financial penalties for delays in completing railway lines or not meeting desired service levels.

Incentive Structures: Revenue-sharing mechanisms aligning profitability with service quality, e.g., sharing revenues based on punctuality and customer satisfaction metrics.

Monitoring and Reporting: Continuous audits and performance reports to ensure compliance and use of independent engineers or third-party validators for oversight.

Risk-sharing: Equitable allocation of risks (e.g., demand risk, operational risk, or regulatory risk) between government and the private partner.

Applications in Railway PPP Projects: Private parties have been engaged for infrastructure development under revenue-sharing models. Monitoring mechanisms are critical to avoid price hikes without corresponding service improvements. PPPs in railway infrastructure ensure efficient capacity enhancement and logistics, with private players incentivized for higher throughput.

Benefits of Agency Theory in Railways PPPs: Ensures alignment of stakeholder interests, reduces inefficiencies and project delays, and balances public service objectives with private profitability. By structuring PPP agreements that address agency problems through clear contracts, aligned incentives, and robust monitoring, railway infrastructure projects can achieve sustainable success.

2.9 Inferences from Literature Review

The main inferences from the literature review can be summarized as under:

- (i) Constraints in Government funding, private financial resources, better efficiency, and long-term development of infrastructure and services were the driving forces behind private sector participation/PPPs.
- (ii) Public Rail System are not market-oriented and need restructuring on commercial lines.
- (iii) PPPs have the potential for adopting both integrated as well as disintegrated approach.
- (iv) Under disintegration approach, separation of infrastructure and services, superstructure and superstructure, right of way and signalling and

telecommunications, and track and terminals has been experimented with. Studies have shown that broadly CSFs in building PPP projects can be categorized in five categories viz supportive legal and regulatory framework, favourable investment ecosystem, risk allocation, proper PPP project selection, efficient procurement process & project implementation expertise and government grant (Ahmadabadi & Heravi, 2019; Aje & Adeniyi, 2012; Alinaitwe & Ayesiga, 2013; Xueqing, 2005; J. Yuan et al., 2021).

- (v) Integrated Rail PPPs have not been very effective since the concessionaire is burdened with traffic / commercial risk due to the overestimation of demand and the vulnerability of governmental policies on fare/ freight structures. Railway infrastructure PPPs are more difficult to implement than in other sectors because of long gestation, higher capital costs, longer cost recovery period, and smaller fare box revenues.
- (vi) Unlike road and airport development, rail infrastructure is rarely fully financed by the private sector. Asset-based concessions are becoming popular, wherein the public sector bears revenue and the concessionaire is compensated based on its performance as per performance stipulated in the contract. For this PPP policy should provide for direct subsidy, awarding an annuity, or combining the project with positive externalities like land development etc.
- (vii) Lack of expertise is one of the hindrances in PPPs which not only restricts PPP formation but also holds back efficiency gains in PPPs (Koppenjan & Leijten, 2005) and calls for developing expertise in various domains of PPP development and implementation.
- (viii) PPPs involve large investments and long-term concessions, and planning, designing, approving, and building a PPP is a long-drawn process. Therefore, consistency in Government policies and support for PPP and a practical approach to modifying PPP arrangements to suit the changing circumstances/ problems is very important.
- (ix) Institutional and regulatory reforms are necessary for attracting Private participation. The PPPs and reform should occur together.
- (x) These reforms should ensure fast-track processes, reduce bureaucratic roadblocks, and avoid conflicts of interest.

2.10 Research Gaps

- (i) Literature research reveals that while extensive studies have been made on service PPPs reform/competition and transformation of railway systems, the literature on Rail infrastructure/integrated PPPs and governing principles for structuring such PPPs is limited only to a few case studies.
- (ii) Especially no study has been made in critical success factors, the impact of stakeholder relationships and impact of government role and regulations in rail infrastructure PPP models brought out by Indian Railways, with a unique composition of government-owned and managed organization.
- (iii) Further, although PPP across the globe has been studied from different perspectives but there is a lack of research on sustainable PPP framework for Indian railways PPP, because PPP in IR is still evolving.
- (iv) This research explores critical factors necessary for the success of Indian Railway's PPP infrastructure projects, analyses the impact of stakeholder relationship and impact of government role and regulations in rail infrastructure PPP models and sustainable PPP framework for Indian Railways PPP infrastructure projects.

Chapter 3

Research Methodology

3.1 General

This study is entirely qualitative. The qualitative research methodology is chosen for the study as it is considered best suited for exploring complex, context-dependent phenomena and allows researchers to gain deep understanding of the behaviours and interactions, perceptions, and experiences that cannot be captured through numerical data alone, particularly in fields like public-private partnerships, social policy, and organizational challenges. The qualitative research ensures:

Exploratory Focus: Understanding stakeholder perceptions of PPP challenges requires detailed narratives rather than numeric aggregation.

Contextual understanding: Many phenomena are influenced by cultural, social, and political contexts that cannot be fully understood through quantitative methods. Qualitative research allows the study of subjects in their natural settings, providing a holistic view. For instance, investigating bureaucratic hurdles in PPP projects requires understanding how individuals experience and navigate these challenges.

Subjective Experiences and Perceptions: Qualitative research is particularly suited for capturing individual or group experiences, opinions, and emotions, which are often critical to understanding human-driven phenomena. Example: Analyzing resistance to privatization in railways involves exploring personal and collective fears, beliefs, and motivations.

Exploring Uncharted Areas: In situations where little prior research exists, qualitative methods provide the flexibility to uncover new patterns and concepts without being constrained by predefined hypotheses.

Interactive Techniques: Methods like participant observation, semi-structured interviews, and focus groups allow dynamic interaction with respondents, enabling researchers to refine their understanding in real time. Engaging with stakeholders in PPP projects can reveal insights about their priorities and concerns through iterative dialogue.

Stakeholder Engagement: Qualitative research fosters dialogue with stakeholders, ensuring their voices are reflected in the outcomes. This is crucial for projects requiring public or private collaboration.

Findings from qualitative studies on PPP challenges can guide more inclusive and practical policy reforms.

The entire procedure has been broken into following broad sections:

Problem Definition and Research Objective: Literature review on overview of IR as an organization, its business lines, institutional structure, PPP policies, and numerous partnership activities, PPP models, steps, constraints, success factors, stakeholders, types etc. Interactions with Ministry of Railways, Zonal Railway, railway PSUs in railway infrastructure development, industry experts, private stakeholders in railway infrastructure, financial institutions, academic peers were also held to gain their opinions and outlook. Information was gathered from several MoR policy documents and publications. Publications of International organizations and significant funders such as the World Bank, Asian Development Bank, and European Union were researched.

Data Collection and Analysis: Policies of MoR, data collection through survey, discussions with experts in IR, SPVs handling IR's infrastructure projects, academicians/ experts in PPP, case studies.

Recommendations, framework designing and validation of framework.

3.2 Business Problem Statement

The current public-private partnership models on IR have failed to attract investments required/ contemplated from Private Participants for expansion of Rail Infrastructure.

The total Debt servicing cost incurred after 2012 (post participative policy) shows that had IR been able to get funding under PPP, debt servicing cost of INR 3,37,876.14 crore in case of Rolling Stock and INR 3,70,019.97 crore under projects could have been saved and the resource so saved could have been used to bridge the throw forward liability/new investment of infrastructure expenditure.

3.3 Motivation for study

- To understand Critical success factors of PPP projects.
- Study different PPP models prevalent in Railways in India.
- Investigate the improvement required in PPP Model/ policies to attract private participations in Indian Railways infrastructure projects.

- To study how PPP can improve Railways efficiency to build infrastructure.

3.4 Research Problem

To explore an ideal sustainable PPP model for Indian Railway infrastructure projects

3.5 Research Questions

RQ1: What are the Critical Success factors of PPP projects?

RQ2: How do stakeholder relationship impact PPP projects in Indian Railways and what role regulations and governance play in these projects?

RQ3: How can a PPP framework be developed to enhance stakeholders' relationship and improve the effectiveness of execution of IR PPP projects?

3.6 Research Objectives

RO1: To study critical success factors in different PPP models in railways infrastructure projects.

RO2: To analyse impact of stakeholders' relationship and regulatory intervention happening in IR's infrastructure PPPs.

RO3: Develop a process framework of sustainable PPP model for IR's infrastructure projects.

3.7 Research Methods for Research Questions:

RQ1: What are the Critical Success factors of PPP projects – Extensive literature review & Survey (EFA used for analysis)

RQ2: How do stakeholder relationship impact PPP projects in Indian Railways and what role regulations and governance play in these projects- Case studies & Focus group discussions

RQ3: How can a PPP framework be developed to enhance stakeholders' relationship and improve the effectiveness of execution of IR PPP projects- from outcome of the above analysis.

3.7.1 Survey:

(a) **Questionnaire:** A questionnaire seeking data on demographic information (part 1) and 17 questions on a 5-point Likert scale of rating (part 2), was developed after series of detailed qualitative discussion with stakeholders, academicians, and study of LR.

(b) **Sample size:** Roughly 10 times the no. of items-Hair, et.al., 2009 Multivariate data analysis- Questionnaire given to 200 stakeholders, 185 responses received, of which 8 were incomplete, 177 complete responses were analysed

(c) **Sample population:**

Stakeholders- Higher management involved in PPP projects and decision-making in Zonal Railways, Ministry of Railways, Ministry of Finance, PPP partners (JVs), Financial Institutions, Railway Public Sector Undertakings involved in rail infrastructure development and Academic peers.

3.7.2 Case Studies

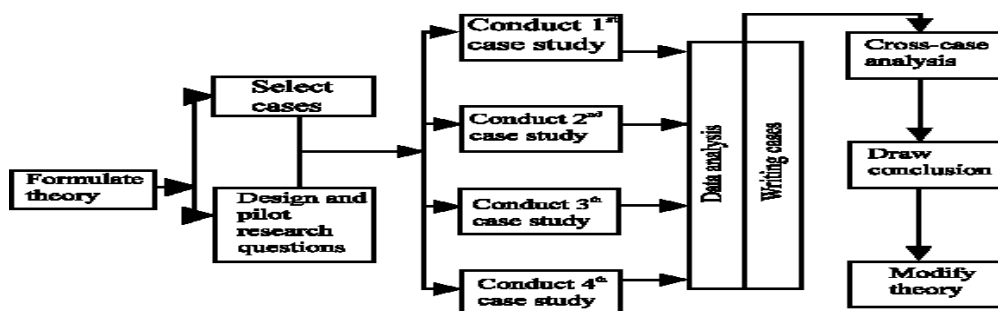
The nature of the research problem determines the method that should be used. According to Morgan and S. Mircich (1980), a research applicability of research method depends on the type of social phenomenon intended to be studied. In social science research, there are essentially two main methodological approaches: positivism and post-positivism (phenomenology). Positivism is an approach for knowledge creation through research that places emphasis on the natural science model, wherein the scientist takes on the role of an objective investigator, gathers the data about the social world and organizes it into a causal chain to explain social life. Post-positivism, on the other hand, is concerned with a reality that is socially created as opposed to determined objectively. Therefore, the goal of social scientists should be to understand the various interpretations and meanings that people assign to their experiences rather than collecting data and calculating the frequency of certain patterns. Thus, positivism, which is grounded in the natural science paradigm for handling facts, is more strongly linked to the quantitative approach to analysis. However, a qualitative approach is necessary for post-positivism, which deals with comprehending the subjectivity of social phenomena. Denzin and Lincoln defined qualitative research as implying a concentration on processes and meanings, that are not thoroughly investigated, measured, or quantified in terms of quantity, amount, intensity, or frequency. Thus, insight, discovery, and interpretation are areas of interest for researchers, especially in the social sciences.

Denzin offers several definitions for the term "case," including "an event," "an entity," "an individual," or even "a unit of analysis". This empirical investigation uses a variety of sources of data to examine a current issue in the context of real-world occurrences. According to Anderson, case studies address the how and why of events, enabling the examination of contextual realities and discrepancies between intended and actual outcomes. A case study is not meant to be an analysis of the complete company. Instead, it is meant to concentrate on a certain problem, characteristic, or analytical unit. The case study approach was selected to comprehend and investigate the procedures of training activities in businesses.

This approach makes it possible to comprehend the intricate real-world tasks that need the utilization of numerous sources of information. According to Patton, using case studies are very appropriate to delve deeply into a topic of interest. Case studies are especially helpful when one wants to comprehend a certain issue or circumstance in greater detail and when one can find cases that are information rich.

Some people have criticized case studies for lacking scientific rigour and reproducibility, as well as for failing to address generalizability difficulties. Nevertheless, case studies have certain advantages, because numerous sources of information are consulted in case studies, which allows the researcher to have a comprehensive understanding of a particular phenomenon or sequence of events and can present a complete picture. The ability to capture the emergent, innate, and inherent characteristics of organizational life as well as the ebb and flow of its activities, particularly in situations where change is occurring quickly, is another benefit of using case studies method. Since the findings from several cases can result in replication, the case studies also permit generalizations. The following graph illustrates the case studies research process in its entirety:

Figure 3.1 : Research Process



As can be seen, the initial step of the present research involved reading a lot of scholarly material on the research topic. In order to gather important insights in the research area for developing the framework for this study, detailed discussions were held with the University supervisor and managerial authorities of stakeholders in Railways, financial institutions and Special Purpose Vehicles engaged in Railway infrastructure projects. Thereafter development of a theoretical framework, to structure the study framework, was taken up. Additionally, a list of research questions for use in discussions was also developed. This study employed purposive sampling as a sampling technique. The management of the stakeholders was consulted in order to determine the respondents' job responsibilities, position, and level of involvement in the

subject under study. The researcher also used his judgement in determining the respondents' capability to supply the information required for the study. Semi-structured questions were used to facilitate discussion with respondents from participating organizations over the majority of the fieldwork. In addition, the researcher also observed different operations carried out inside each organisation that was studied. In addition to the discussions and direct observation, the fieldwork also involved document analysis from the organization's resource centre, file record, libraries, company reports, company newsletter, and other printed materials (such as training packages, conference reports, articles, journals etc.) that were considered necessary from the point of research. Given that people occasionally say and do different things, documentary evidence serves as a way to cross-validate information obtained through discussions and observation. The validity and reliability of the conclusions are therefore corroborated by the confirmation of the case studies using qualitative techniques.

3.7.3 Discussions

(a) Semi-structured discussions: Due to the qualitative nature of the research, Stakeholder participation was used, which works well with the group discussions and case study technique. Semi-structured discussion technique was chosen because they provide enough flexibility to approach various respondents in different ways, while still addressing the same data-gathering topics. Questions for semi-structured discussions were thoughtfully crafted to ensure sufficient coverage for the objectives of the study. A general statement that was followed by a series of follow-up questions for additional investigation served as the basis for the major inquiries. Since not everything can be written down during discussions, the conversations were tape-recorded to ensure an accurate account of the discussions and prevent data loss. In order to gain information not available through other means, participant observations were also examined.

(b) The use of multiple case studies to enhance generalizations: In the research study, the multiple case study method was used. Since the multiple-case studies follow a replication, the researcher anticipates comparable results (a replication). The replication that is discovered in multiple cases, gives more trust to researcher in the overall conclusions. A very strong conclusion is reached when consistent findings are developed over a number of cases. Analysing many organizations helps to capture the comprehensive essence of the subject under study, which improves the accuracy, validity, and dependability of the results.

Chapter 4 of the present thesis discusses the findings from case studies on railroad infrastructure SPVs and talks with important stakeholders.

3.7.4 Steps:

(a) Case Study:

- Visiting all working SPVs providing rail infrastructure
- Collecting observations and Data

(b) Group discussions:

- 9–12-member panel (mix of stake holders & subject experts including academician)
- Asking set of questions created from case studies
- Creating and coding transcript
- Analysis of discussions

(c) For Research Objective-1, theoretical framework related to critical success factor behind the Infrastructure PPPs was identified by extensive reviewing the existing literature and survey. Factors in this review was selected according to the judgment of their relevance to the issue of sustainability of IR's infrastructure PPPs projects. Before data collection, discussions were held with the SPVs/ PPP managers and higher management officials of Ministry of Railways. The discussion was conducted at level of Senior Management to have insight on success factors necessary for infrastructure PPPs on Railways. The insight so gained was re-validated with the Literature Research. Based on the insight so drawn, twenty-five items were developed in consultation with the Guide. These were again discussed with the important stakeholders, academicians and Guide and based on their suggestions finally 17 questions were framed for survey. Part 1 of the survey questionnaire contained demographic information about name, organization, position held, experience in PPP and part 2 contained the main questionnaire seeking data on 5-point Likert scale

(d) For the Research Objective- 2, an in-depth understanding of the stakeholder relationship, regulatory framework, business model, strategy & and practices of stakeholders of the present PPP policies and model on IR was required. Therefore, qualitative research method was considered a suitable method for capturing and reusing tacit and explicit knowledge in the field of best practices amongst the Railways PPP operators. The purpose of this research work was to understand the dynamics in term of business model, strategy, process and practices of prominent Railway PPPs in India. Further, to understand

how these formulated strategies and models are being practiced by them, a case study approach has been selected for this research study because, it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result” (Yin, 2003). Multi case holistic design (Yin 2003) of case study research design has been used because, the evidence from multiple cases is often more compelling, and the overall study is therefore regarded as being more robust. Comparison of business model, strategies and practices has been done and then Cross-Case analysis of business model, strategy & practices conducted. Common and different strategic practices applicable have been identified and based on the study of above cases the process framework of sustainable business model for IR has been developed.

(e) For Research Objective- 3, insight gain from RO-1 & 2 has been used to develop the model for successful rail infrastructure PPP. To narrow down the vast amount of material on the subject and to focus on the research area, researcher has classified the various factors into broad categories i.e. firm related and environment related factors. Firm related factor are those factors which are controllable by IR itself and environmental related factors are those macro factor over which IR don't have any control and majorly decided by government policies and macroeconomic condition of the country. The suggested model and required changes in policies and business model have been recommended accordingly.

(f) Data Collection: Sources of data – Both primary and secondary data has been used.

(i) Primary data

The primary data has been collected from the personnel using the Survey and case study protocol. A case study protocol is a document that contains the questionnaire (instrument) on initial conceptual constructs selected from literature review for data collection as well as the procedures and general rules to be followed in using the protocol. During data collection stage, Construct validity was checked using multiple sources of evidence (document analysis) and reliability ensured by using case study protocol (Yin, 2003). The detailed case study protocol was developed before data collection and group discussions with the SPVs/ PPP managers and officials of Ministry of Railways will be conducted. The discussions were held at level of Senior Management to collect the data for the study of business model, strategies & practices in prominent

infrastructure PPPs on Railways (with mix of stake holders and subject experts including academicians) asking set of questions created from case studies.

(ii) Secondary data

Secondary data was culled out from reports and publications of following: -

- Annual Reports & Monthly Reports by national & international infrastructure PPPs
- Ministry of Railways Reports
- International journals and Reports

(g) Elimination of Researcher Bias

Researcher bias in qualitative research occurs when the researcher intentionally or unintentionally influences their results in favour of a specific outcome. This has been averted by ensuring that the item for survey were initially developed after qualitative discussions with Industry experts and stakeholders and finalised after detailed review in consultation with the industry experts and Academic peers and the university supervisor on 5-point Likert scale of rating. An external peer review was carried out before finalising the survey / questions for discussions for ruling out gaps/ bias. Data collection was also done impartially, and Exploratory Factor Analysis was done on data using SPSS to rule out any bias in interpretation. The data was interpreted in consultation with University Supervisor to ensure that the interpretation is consistent with another independent understanding. The significant factors emerged from EFA were again discussed and their nomenclature was determined based on an understanding of the literature and with the help of the university supervisor and three senior industry persons involved in the Indian Railways' PPP projects to avoid bias in qualitative research. Further the result of data analysis also in consonance with the inferences of LR.

As regards, group discussions, the issues and questions of importance on stakeholder concerns on IR's PPP policies and models were held to understand issues hindering private participation in PPP infrastructure projects in Railways. To draw on the experience and expertise of participants, group discussion involved two-way communication between participants and data was collected through a semi-structured group discussion process about the pain points of the present PPP policies and models affecting stakeholders' synergies in railway PPP for infrastructure projects besides the impact of existing regulatory mechanism and required improvements. The main means of data collection

during the group discussion were tape recording, note-taking, and participant observation. The same were transcribed in consultation with the supervisor. The detailed outcome is stated in Chapter 4.

(h) Data Analysis

The primary focus of this study was to uncover the critical success factors of PPP project success in Indian Railways. To do so, the data were collected on a five-point Likert scale against various items (questions) developed and extracted from the literature, as well as through qualitative discussions with the key stakeholders involved in various past and present PPP railways projects. The data collected through the questionnaire was entered into SPSS version 21 for analysis. The first part of the questionnaire consisted of demographic information like name, organization, positions held by the respondents in their respective organizations and experience/ knowledge about PPP. Firstly, a frequency analysis was conducted to gain insights into the respondents' profiles. Further, the exploratory factor analysis became the natural statistical tool to uncover the underlying dimensions of PPP success in Indian railways. In order to test the appropriateness of the factor model, Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) test of sampling adequacy were conducted, and principal component analysis was chosen as a method of factor analysis. Further, the varimax procedure was chosen as a method of rotating the factors so that variables with high loadings on a factor are minimized, thereby enhancing the interpretability of the factors. All results are presented in Chapter 4.

3.8 PPP Success Factors as per Literature Review and Expert Opinion

The existence of favourable, supporting environmental, legal, regulatory and political factors is positively related to PPP success in the railway infrastructure projects in India.

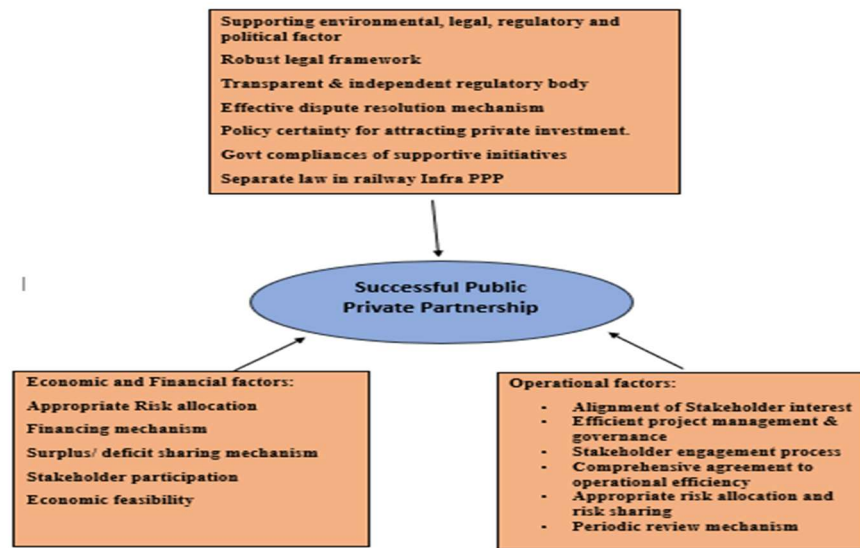
The availability of a favourable economic and financial factors is positively related to PPP success in the railway infrastructure projects in India.

The availability of operational factors is positively related to PPP success in the railway infrastructure projects in India. These were confirmed by EFA.

Looking at the factors and the percent of variance explained by each of them in the data analysis, the third factor, namely, Operational efficiency, explained the majority of the variance (36.796 %) and hence contributed the most to PPP success. The other two factors contributed almost equal percentages of variance (approx. 11 %). The results are explained in Chapter 4.

PPP Success Framework (as per Literature Review and expert opinion)

Figure 3.2 PPP Success Framework



3.9 Contribution to Industry/Outcome

- (i) Helps to understand the PPP critical success factors issues from stakeholders' perspective in IR.
- (ii) Helps to create better regulatory/ governance regime for PPP in IR
- (iii) Helps to develop a sustainable PPP framework for IR infrastructure projects for maximization of government objectives and incentives for Private participants.

Chapter 4

Data Analysis

4.1 Primary Data Collection

The primary data collection was done with the objective of exploring critical success factors for IR infrastructure projects. For this, preliminary discussions were held with the stakeholders from Railway infrastructure SPVs, Railway PSUs, higher management officials from Zonal Railways and the Ministry of Railways involved in PPP projects. This gave insight into important and significant factors which were re-validated with the LR. Based on the insight so drawn, twenty-five questions were developed in consultation with the Guide. These were again discussed with the important stakeholders, academicians and guide and based on their suggestions for rewording/ reframing 17 questions were framed for survey. The questionnaire had two parts, part 1 contained demographic information about name, organization, position held, experience in PPP and Part 2 contained the main questionnaire seeking data on a 5-point Likert scale

4.2 Sample Size

Sample size was kept roughly 10 times the no. of items (Hair et al., 2009) and Questionnaire was given to 200 stakeholders of which 185 responded, 8 responses were found incomplete, thus 177 complete responses received were analysed. Of these 132 respondents had more than 20 years of experience in Railway PPP projects.

4.3 Sample population

Sample population comprised the stakeholder's higher management above JS level involved in PPP projects in MoR, ZR, Senior management of Railway Infrastructure SPVs and Ministry of Finance (MoF), Financial Institutions, Railway PSUs and Academic peers.

The data collected through the questionnaire was entered into SPSS version 21 for analysis. All results are presented in this data analysis section. First, the researcher provides a brief summary of descriptive results, followed by the exploratory factor analysis to uncover the underlying factors of PPP success in the Indian Railway. As stated, the first part of the questionnaire consisted of demographic information like name, organization, positions held by the

respondents in their respective organizations and experience/ knowledge about PPP. Firstly, a frequency analysis was conducted to gain insights into the respondents' profiles.

4.4 Analysis-Underlying dimensions of PPP project success in Indian Railways

The primary focus of this study is to uncover the critical success factors of PPP project success in Indian Railways. To do so, the data were collected on a five-point Likert scale against various items (questions) developed and extracted from the literature, as well as through qualitative discussions with the key stakeholders involved in various past and present PPP railways projects as brought out in the foregoing para. Further, the exploratory factor analysis became the natural statistical tool to uncover the underlying dimensions of PPP success in Indian railways. In this section, the researcher reports the results of exploratory factor analysis.

Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test of sample adequacy were used to evaluate the suitability of the factor model. By testing the null hypothesis that the variables in the population are uncorrelated, Bartlett's test of sphericity determines if the population correlation matrix is an identity matrix, meaning that all of the diagonal elements are unity and all of the off-diagonal elements are zero. The test statistics for sphericity is based on the chi-square transformation of the determinant of the correlation matrix. A significant value of the test statistics will favour the rejection of the null hypothesis. Furthermore, the suitability of the factor analysis may be questioned if the null hypothesis cannot be disproved. In the present case of PPP success factors, Bartlett's test of sphericity was found to be significant at 0.00 (Chi-square = 1367.895, df = 136, $p = 0000 < 0.01$, from Table-4.1), suggesting the appropriateness of the proposed factor model.

Another test statistic used for evaluating the suitability of the factor model is the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy. This test index compares the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients. The small values of the Kaiser-Meyer-Olkin (KMO) statistic imply that the correlation between pairs of variables cannot be explained by other variables and in such cases the factor analysis is not considered appropriate. The generally accepted minimum value for appropriateness of this test is 0.60 (Hair et al., 2009). In the present case,

KMO was found to be 0.866, above the generally accepted minimum of 0.60 (Hair et al., 2009), hence suggesting the appropriateness of the proposed factor model. The following table-4.1 summarizes the results of this analysis.

Table 4.1: KMO & Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.866
Bartlett's Test of Sphericity	Approx. Chi-Square	1367.895
	Df	136
	Sig.	.000

Based on the above two statistics, the factor analysis was deemed appropriate, and principal component analysis was chosen as a method of factor analysis. Further, the varimax procedure was chosen as a method of rotating the factors so that variables with high loadings on a factor are minimized, thereby enhancing the interpretability of the factors. While interpreting the factors, only loadings of 0.6 or greater (refer Table-4.2) on the factor have been considered (Igbaria et al., 1995). One items namely “How effectively do you think contracting is carried out to provide scope for private players to sustain their business in PPP projects within Indian Railways?” could not correlate with any of the factors, and hence was removed. **Resultantly, three significant factors emerged with eigenvalues greater than one and contributed 59.77% of the variance from the total of 16 components of PPP success.** The rotated component matrix is presented in Table 4.2 below-

Table 4.2: Rotated component matrix

Attributes	Component		
	1	2	3
How aligned do you perceive the clear objectives and interests of stakeholders to be in PPP projects within Indian Railways	0.804		
To what extent do you believe that efficient project management and governance positively contribute to the success of PPP projects in Indian Railways?	0.827		
How effective do you find the stakeholder engagement processes in PPP projects within Indian Railways?	0.783		

To what extent do you believe that comprehensive agreement including exit/trade options positively contribute to the success of PPP projects in Indian Railways?	0.714		0.665
How satisfied are you with the periodic review mechanisms implemented in PPP projects within Indian Railways?	0.668		
% of variance explained -----> 36.796			
How satisfied are you with the current mechanisms for risk allocation and sharing among stakeholders in PPP projects within Indian Railways?		0.745	
To what extent do you agree that adequate financing mechanisms positively contribute to the success of PPP projects in Indian Railways?		0.797	
How would you rate the effectiveness of surplus/deficit sharing mechanisms in ensuring the viability of PPP projects in Indian Railways?		0.776	
Do you believe that stakeholder participation during financial crises is crucial for maintaining the success of PPP projects in Indian Railways?		0.81	
How challenging do you find the economic feasibility analysis of railway infrastructure projects within the current PPP framework?		0.61	
% of variance explained ----> 11.85			
To what extent do you believe that a robust legal framework positively contributes to the success of PPP projects in Indian Railways?			0.76
How would you rate the transparency and independence of the regulatory body overseeing PPP projects in Indian Railways?			0.83
Do you agree that an effective dispute resolution mechanism is essential for ensuring the success of PPP projects in Indian Railways?			0.688

How important do you think it is to have policy certainty for attracting private investment in railway infrastructure through PPP models?			0.772
How satisfied are you with the current level of compliance by state governments in supporting PPP initiatives in Indian Railways?			0.751
Do you think that having a separate law or acts specifically designed for railway PPP projects is necessary for their success?			0.605
% of variance explained ----> 11.12			

Further, the suitable nomenclature for three significant factors was determined based on an understanding of the literature and with the help of the university supervisor and three senior industry persons involved in the Indian Railways' PPP projects. The three factors and their respective names are displayed in **Table 4.3**.

Table 4.3: Nomenclature for three significant factors underlying PPP success in Indian Railways

Factor-1: Operational efficiency
How aligned do you perceive the clear objectives and interests of stakeholders to be in PPP projects within Indian Railways
To what extent do you believe that efficient project management and governance positively contribute to the success of PPP projects in Indian Railways?
How effective do you find the stakeholder engagement processes in PPP projects within Indian Railways?
To what extent do you believe that comprehensive agreement including exit/trade options positively contribute to the success of PPP projects in Indian Railways?
How satisfied are you with the periodic review mechanisms implemented in PPP projects within Indian Railways?
Factor 2: Economic and Financial Capability
How satisfied are you with the current mechanisms for risk allocation and sharing among stakeholders in PPP projects within Indian Railways?

To what extent do you agree that adequate financing mechanisms positively contribute to the success of PPP projects in Indian Railways?
How would you rate the effectiveness of surplus/deficit sharing mechanisms in ensuring the viability of PPP projects in Indian Railways?
Do you believe that stakeholder participation during financial crises is crucial for maintaining the success of PPP projects in Indian Railways?
How challenging do you find the economic feasibility analysis of railway infrastructure projects within the current PPP framework?
Factor3: Legal & regulatory support
To what extent do you believe that a robust legal framework positively contributes to the success of PPP projects in Indian Railways?
How would you rate the transparency and independence of the regulatory body overseeing PPP projects in Indian Railways?
Do you agree that an effective dispute resolution mechanism is essential for ensuring the success of PPP projects in Indian Railways?
How important do you think it is to have policy certainty for attracting private investment in railway infrastructure through PPP models?
How satisfied are you with the current level of compliance by state governments in supporting PPP initiatives in Indian Railways?
Do you think that having a separate law or acts specifically designed for railway PPP projects is necessary for their success?

Now, looking at the factors and the percent of variance explained by each of them, the first factor, Operational efficiency, explained the majority of the variance (36.796 %) and hence contributed the most to PPP success. The other two factors contributed almost equal percentages **of variance (approx. 11 %)**.

4.5 Case studies & Discussions

4.5.1 Models and PPP Policy framework for infrastructure projects in Indian Railways

PPP initiatives have been undertaken in many different forms all around the world. In this regard, Indian Railways (IR) over the years has also developed PPP models for rail connectivity projects with non-government resources either fully or partially. Under this initiative, the Pipavav Port Rail Connectivity, Mundra Port Rail Connectivity, and Hassan-Mangalore Rail Line, were executed around 2002-03 in partnership. The Hassan-Mangalore rail project and the Pipavav port connectivity project were carried out by joint venture entities in

which MoR holds equity while Mundra port connectivity was executed with entire funding done by the port authority itself.

Between 2005–2006 and 2010–11, five distinct JVs were created, namely, Krishnapatnam, Haridaspur-Paradip, Kutch Railway, Bharuch-Dahej, and Angul-Sukinda rail projects bringing together many stakeholders, including the state government as participants in the joint venture firm. In these JVs, Rail Vikas Nigam Limited, a PSU of IR represented the Railways.

To codify this initiative and attracting more private investments in providing rail connectivity, IR in 2012, notified a participative policy containing five models for the execution of rail connectivity projects using extra-budgetary resources from stakeholders and investors. The following models have been notified in the 2012 policy:

- (i) Non-Government Lines Model on revenue sharing
- (ii) Joint Ventures (J.V.) Model on revenue sharing
- (iii) Build, Own, Operate, and Transfer Model on revenue sharing
- (iv) Annuity Model of fixed fee recovery basis
- (v) Customer Funded Model on discount on freight moved on the line
- (vi) Foreign Direct Investment (F.D.I.) into Asset Creation

Of these, three models viz Non-Government Lines Model, Joint Venture and customers funded model involve the participation of strategic investors/customers while remaining two others i.e., Built Own Operate and Transfer and Annuity models are pure PPP models. The details of these models have been discussed in Chapter 1.

Various Rail connectivity projects have been taken up under these models of participative policy in association with Coal companies, Ports, cluster of industries State Governments/Local bodies/PSUs as stakeholder for the development of new lines/gauge conversion project etc. The train operation continues to remain with Railway in all these PPP Projects. Till now, 14 projects of ₹ 9234 Cr have been completed through participative mode. 10 projects of ₹ 19417 Cr are under implementation including coal connectivity and port connectivity projects and in addition, 8 more projects of ₹ 13871 Cr have been given in-principle approval. (Table 1.8 refers).

Although the new public-private partnership policy of IR has attracted private sector commitment of about INR 30,000 crore so far, mainly in last mile rail-connectivity works to link many ports and industrial hubs, but it is far from

targets, given the forecasted requirements. According to a study report by Ernst & Yong, India on Public Private Partnerships in Indian Railways, unless the Ministry of Railways takes reformative steps, a big jump in private investment will be difficult in the present situation, wherein Indian Railways acts both as the operator as well as the regulator.

The total debt servicing cost incurred after 2012 (post participative policy) shows that had IR been able to get funding under PPP, a debt servicing cost of INR 3,37,876.14 crore in case of Rolling Stock and INR 3,70,019.97 crore under projects could have been saved and the resource so saved could have been used to bridge the throw forward liability/new investment of infrastructure expenditure (Table 1.9 refers).

Starting from 2003, MOR sanctioned and commissioned 7 SPV/JV projects (PRCL, BDRCL, HMRDC, HPRCL, KRCL, ASRL & Kutch Railway). Under the revenue model of JVs IR will pay to the JV apportioned revenue net of such cost as applicable, as per a pre-defined formula specified in the O&M agreement. This includes apportionment (as per Inter Railway Financial Adjustment rules) of freight revenue on the basis of distance and terminal charges (TC). IR will recover O&M cost or cost of operation as applicable as per the Agreement which includes Fixed cost i.e. the cost of essential operational and maintenance staff and other maintenance expenditure (if maintenance is to be done by IR) or the cost of supervision/certification and Variable cost of operation i.e. the cost of rolling-stock usage, fuel, crew etc., from the apportioned revenue (Table 4.4).

Table 4.4: Status of infrastructure JV projects on IR

MODEL	Number of projects	LENGTH (KM)	COST (INR Cr)
JV Projects – Commissioned			
Joint Venture (JV)	6	1013	10,305
JV Projects – Under Implementation			
Joint Venture (JV)	5	549.7	16,246
JV Projects – In Principal Approval Given			
Joint Venture (JV)	1	32	1,385
JV Projects – Closed as Not Bankable			
Joint Venture (JV)	2	71.3	-
JV Projects – Closed & Taken Up as Railway Project			

Joint Venture (JV)	4	575	-
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4.5.2 The case study of these PPPs has revealed the following findings:

(i) **Pipavav Railway Corporation Limited (PRCL)**

Figure 4.1



PRCL is the milestone initiative of IR's infrastructure partnership project to demonstrate the formation, interfaces, and implication of existing PPP models. It is the first partnership project for infrastructure provisioning of port connectivity, and the model has been replicated in all future port connectivity projects. The main covenants of PRCL are summarized below (Table 4.5):

Table 4.5 Main covenants of PRCL concession agreement

Concession Agreement	
Rights of Pipavav Railway Corporation Limited	Pipavav Railway Corporation Limited granted right to plan, develop, finance, build, own, and operate the project besides running the freight train services on the project line.
Responsibilities of Pipavav Railway Corporation Limited	Pipavav Railway Corporation Limited is responsible to undertake operation and maintenance of the project line through Western Railway; make payment of Operation and Maintenance charges (fixed by railways) to Western Railway; and provide access for running trains to the Railways
Rights of Ministry of Railways	Ministry of Railways is entitled to run trains on the project and collect tariff from freight traffic and haulage charges from container traffic; right to fix tariff for traffic moving on the project line. Additionally, the railway is also permitted to operate passenger services equivalent to those that were offered on the metre gauge railway line at the time of execution of project, without having to pay any

	access fee to the Pipavav Railway Corporation Limited.
Responsibilities of Ministry of Railways	Ministry of Railways is responsible to bear running and operating costs of passenger services
Scope of Design and Engineering	Western Railway has been given responsibility for completing all design, drawing, and engineering requirements necessary to complete the project in accordance with Indian Railways' technical standards and specifications.
Purchases	Pipavav Railway Corporation Limited has been given the responsibility of obtaining the basic construction material viz rails, ballast, sleepers, signaling, and telecommunication equipment, needed for construction. These items were to be provided as free material to Western Railway, and Western Railway was to acquire the remaining materials.
Duties of the Western Railway	The assets were considered to have been taken over by Western Railway for the purpose of operating the freight transportation services and the maintenance of the project railway-line as soon as the Chief Engineer certified its fitness for operation. Further, for maintenance of the project assets, Western Railway is liable to adhere to the maintenance schedule and standards specified by Ministry of Railways or its designated agencies.
Entitlements of Western Railway	Western Railway is entitled to operate the goods trains and collect revenues on the project railway line. Additionally, Western Railway is also permitted to operate passenger services equivalent to those that were offered on the metre gauge railway line at the time of execution of project, without having to pay any access fee to the Pipavav Railway Corporation Limited.
Apportionment of Revenue	Western Railway is responsible to arrange payment of the apportioned share of revenue due from freight traffic running on the project railway, to Pipavav Railway Corporation Limited monthly after deducting the cost of operation and maintenance services provide by the railway to PRCL.
Accidents and interruptions	Western Railway responsible for any accident unless it is attributable to a Force Majeure event, and also to bear the cost of restoration and relief work including any compensation payable to any third party as per rules stipulated by Ministry of Railways.

271 km Single Line/Electrified from Surendra Nagar to Pipavav has been constructed under this project at total cost of INR 662.47 crore The project completed in 2003. Share Holders of the project are Gujarat Pipavav Port limited: 38.78%, General Insurance: 2.55%, New India Assurance: 2.55%, IL&FS: 6.12%. MoR INR 98 crore (50%). The concession period is 33 years.

Benefits to IR: 271 km line GC and electrification has been completed with IR investment of Rs 98 Crore only. Dividend of INR 88 crore paid to IR/ Government. Timely connectivity to Pipavav Port resulted in movement of 6-8 MT p.a. The strength of Board of Directors (BoD) is 10 with 6 IR representatives.

The Railway has handled 6.93 MT in FY 2021-22. The revenue in FY 2021-22 was INR 195.81 crore (Apportioned Revenue - INR 191 crore, Terminal Charges -INR 4.81 crore). The O&M Cost during FY 2021-22 was INR 142 crore (Operations Cost= INR 75 crore; Maintenance- INR 65 crore; Lease Rental INR 2 crore). The maintenance Cost per km was INR 24 Lakh (Single Line).

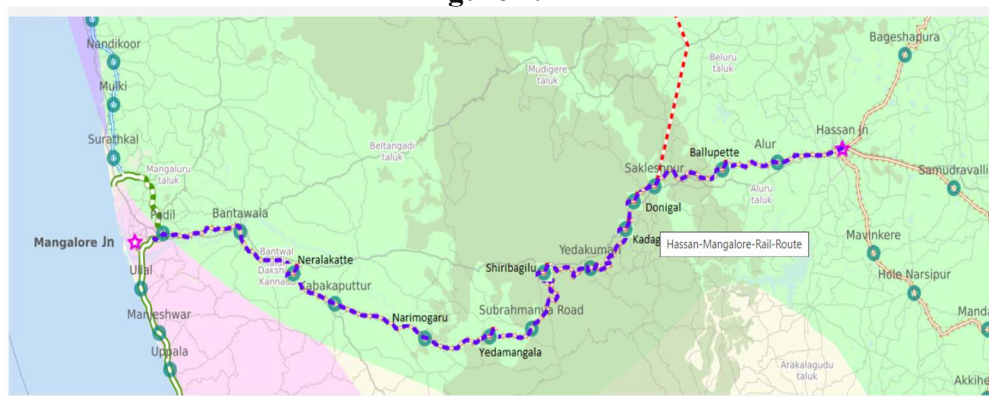
Apportionment: INR 2500/6000 crore per annum outgo in/by 2022/2030.

Currently 12% (approx) of traffic km on full is carried lead by SPV.

Total traffic originating from SPV route is around INR 28000 crore -Challenges with changing Tax regime, e.g. GST. (INR 58 crore impact PRCL) -With huge investments proposed- Models needs a revisit.

(ii) Hasan Mangalore Rail Development Company (HMRDC)

Figure 4.2



183 Km Single Line/Non-Electrified from Hassan to Mangalore has been constructed under this project at total cost of INR 322.96 crore. The project completed in 2006. Share Holders of the project are GoK- 40%, New Mangalore Port -9%, Mineral Enterprise Ltd- 9%, K-RIDE – 2%, MoR-40% (Total INR 67 crore; MoR share- INR 45 crore). The concession period is 32 years.

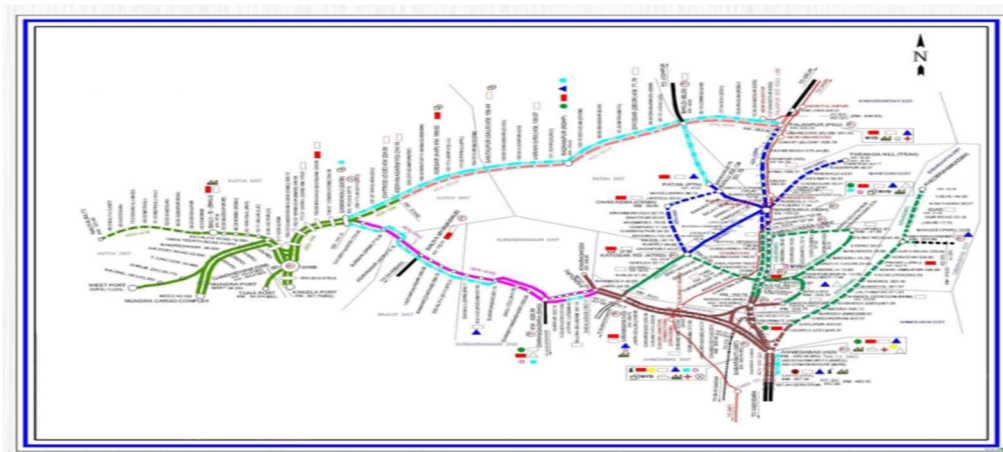
Benefits to IR: The 183-kilometre rail line connecting to Mangalore Port was constructed with MoR investment of INR 45 crore only. Timely connectivity to Mangalore Port resulted in movement of 3-4 MT pa. The strength of BoD is 8 with 3 IR representatives.

The Railway has handled 3.48 MT in FY 2021-22. The revenue in FY 2021-22 was INR 119 crore (AR - INR 191 crore including inflated mileage of 55-

kilometre ghat section, Terminal Charges -Nil). The O&M Cost during FY 2021-22 was INR 145 crore (Operations cost INR 90 crore; Maintenance- INR 55 crore; Lease Rental INR 2 crore). The maintenance Cost per km was INR 30 Lakh (Single Line). Deferred Payment (of 2006 -16) - Indirect Overheads INR 74.14 crore is outstanding amount).

(iii) Kutch Railway Corporation Limited (KRC)

Figure 4.3



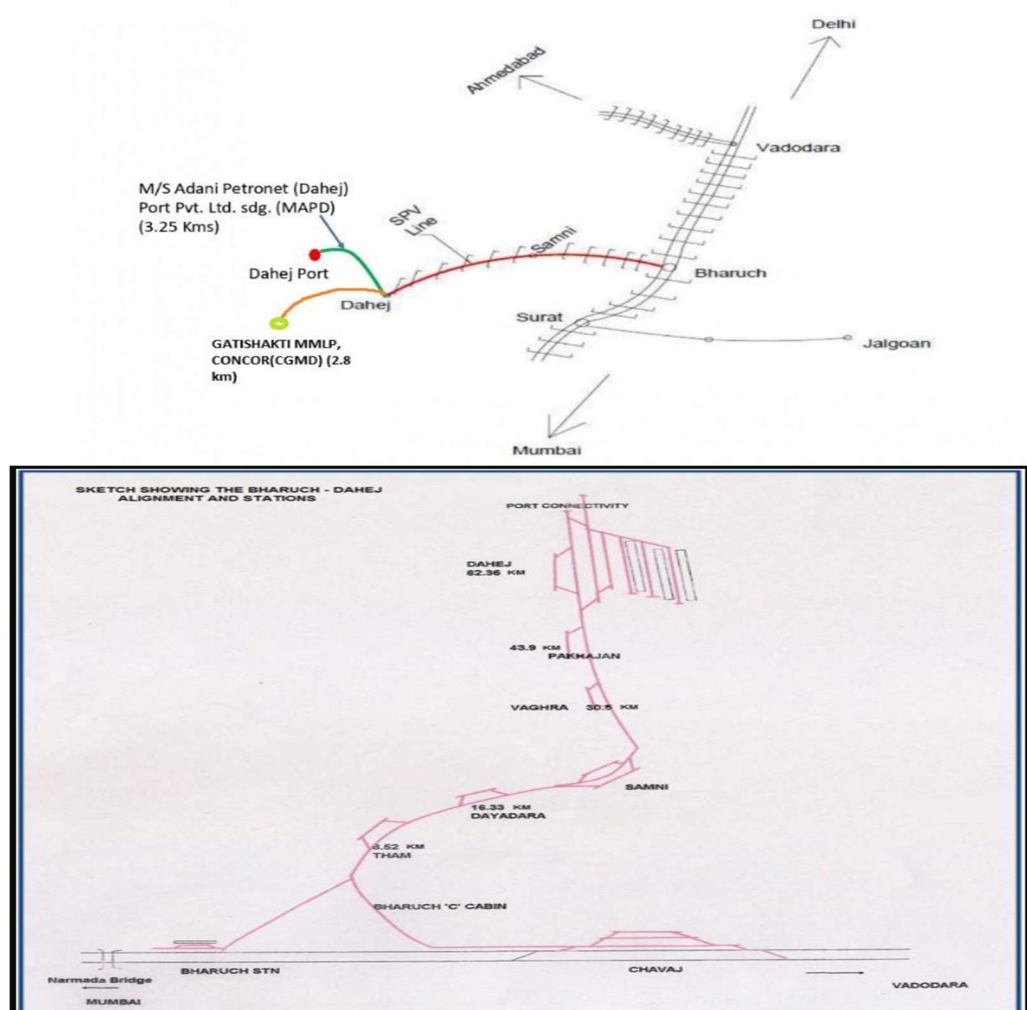
Ministry of Railways has embarked upon strengthening of rail connectivity to various ports under National Rail Vikas Yojana. The developments in ports in Gandhidham area necessitated creation of additional freight corridor to connect its northern hinterland. Accordingly, Ministry of Railways decided for gauge conversion of existing meter gauge rail line between Gandhidham- Palanpur (301 Route kilometre) to the board gauge line. After establishment of Rail Vikas Nigam Limited, this project was handed over to it for execution. Rail Vikas Nigam Limited formed a Special Purpose Vehicle and set up Kutch Railway Company with equity contribution from RVNL, Deendayal Port Trust, Adani Ports & SEZ Ltd. and Government of Gujarat to undertake the gauge conversion of Gandhidham- Palanpur meter gauge rail line. Subsequently the SPV also has successfully completed and commissioned the Doubling of Palanpur Junction to Samakhiali (248 Route kilometre) project line and Railway Electrification works on Gandhi Dham- Samakhiali -Palanpur rail line (301 Route kilometre). The 301 Kilometre Double Line/Electrified from Gandhidham – Palanpur has been constructed under this project at total cost of INR 4269.83 crore. The project completed in 2003. Share Holders of the project are RVNL- 50 %, Deendayal Port Trust- 26%, Adani Port & SEZ- 20%, GoG – 4%. The concession period is 32 years.

Benefits to IR: 301 Km line constructed with Rs 100 cr equity investment of IR/RVNL. Revenue earned is ploughed back in Doubling and Electrification without any direct investment by IR. Connectivity to Deendayal Port & Adani Port enabled Capable to operate double stack containers. The maintenance is mechanised maintenance. Timely connectivity to the Ports resulted in movement of 40-45 MT p.a. The strength of BoD is 14 with one IR representatives.

The Railway has handled 42.6 MT traffic in FY 2021-22. The revenue in FY 2021-22 was INR 835 crore (AR - INR 832 crore, Terminal charges - INR 3 crore). The O&M Cost during FY 2021-22 was INR 643 crore (Operations Cost INR 521 crore; Maintenance- INR 122 crore). The maintenance Cost per km was INR 40 Lakh (Double Line). The railway has debt liability of INR 938.40 crore as on 31st March 2022.

(iv) Bharuch Dahej Railway Company Limited (BDRCL)

Figure 4.4 & 4.5



Government of India has identified Dahej as a Petroleum, Chemicals and Petrochemical Investment Region and additional privately managed jetties have been constructed for import of coal and fertilizer. This is in addition to the petrochemical, copper, fertilizer and steel pipe industries already based in the area. Therefore, to meet the demand of the port traffic, Bharuch Dahej Railway Company Limited (BDRCL) was set up through a Special Purpose Vehicle for conversion of the existing narrow gauge railway line between Bharuch and the Port of Dahej (61.6-kilometre) in Gujarat to broad gauge railway line. Subsequently, this rail section was extended up to Chavej by constructing a rail line between Bharuch and Chavaj (5.52 Kilometre) on operational considerations. The area is slated to become a major industrial hub along Delhi - Mumbai industrial corridor and generate sizable rail borne freight traffic besides being an important feeder route to the upcoming Western Dedicated Freight Corridor.

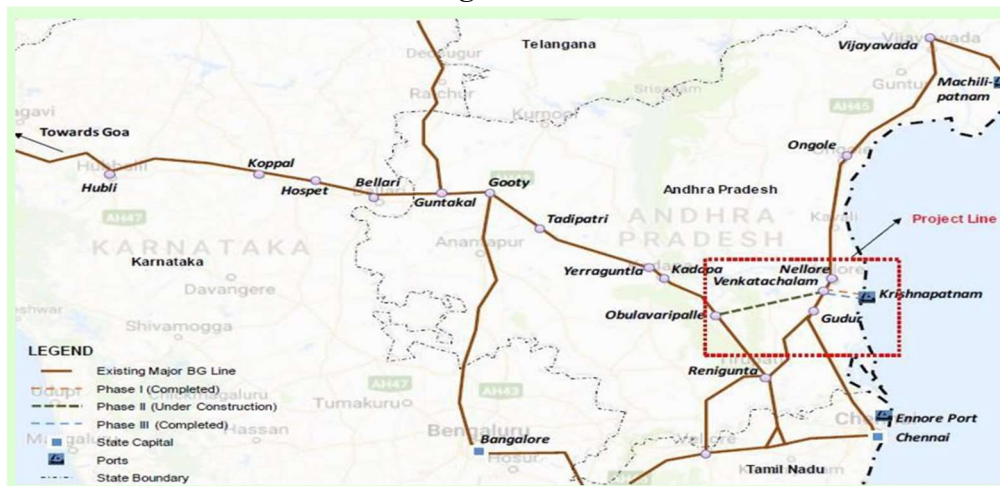
The 63 Kilometre railway line from Dahej to Bharuch has been constructed at the project cost of INR 416 crore, connecting Dahej Port with the railway network. The project was completed in 2012. The shareholders are RVNL- 35.46%, Gujarat Maritime Board - 11.51%, Gujarat Industrial Development Corp -11.51%, Adani Petronet (Dahej) Port- 11.18%, Dahej SEZ- 6.45%, Gujarat Narmada Valley Fertiliser & Chemicals - 8.72%, Hindalco- 8.72%, Jindal- 6.45%. (Total INR 155.11 crore). The concession period is 30 years or till the time the NPV payback (@14%) is equal to the equity investment reached.

Benefits to MoR: The railway line from Dahej Port to Bharuch was constructed without any investment by IR. Timely connectivity to the Port resulted in the generation of additional freight traffic of 2-3 MT per annum.

The Railway handled 2.33 MT traffic during FY 2021-22 and earned revenue of INR 48.43 crore. The total O&M cost incurred during 2021-22 was INR 24 crore (Reserved Services = INR 10 crore; Maintenance = INR 14 crore). The maintenance Cost per kilometre was INR 22 Lakh (Single Line), and part of the maintenance is done by JV itself. The railway has a debt liability of INR 63.97 crore as of 31.03.2022.

(v) **Krishnapatnam Railway Company Limited (KRCL)**

Figure 4.6



The Ministry of Railways steered the National Rail Vikas Yojana in December 2002 with a view to achieve significant transport capacity improvement in pathways on the densely congested Golden Quadrilateral and Diagonals routes besides last mile rail connectivity to the Ports. As part of this ambitious Yojna, Ministry of Railways entered into a Memorandum of Understanding with RVNL on 16th October 2003, to create project specific Special Purpose Vehicles under Public Private Partnership mode of financing. In furtherance, MoR identified Obulavaripalle- Krishnapatnam (Port Connectivity) project to be executed under the Rail Vikas Yojana and a MoU was signed in 2005 (November 22nd) between Rail Vikas Nigam Limited, Government of Andhra Pradesh and the Krishnapatnam Port Company Limited to set up a Joint Venture Company as special purpose vehicle to implement the project. The Krishnapatnam Railway Company Limited was incorporated on October 11, 2006 under Companies Act, 1956 with the objective of construction, operation and Maintenance of the 114 Kilomtre new broad gauge electrified rail line (a Green Field Project) from Krishnapatnam to Obulavaripalle and the concession agreement was signed between MoR and KRCL on November 23, 2007. Under this agreement, MoR has leased all the assets on the existing Krishnapatnam rail line to the Krishnapatnam Railway Company Limited for a concession period of 30 years and also authorized the Company to construct, operate, maintain, and manage the project railway line. The project connects

Venkatachalam, the existing Station of South-Central Railway, passing through existing Gudur – Vijayawada main line on the Trunk Route of Chennai – Kolkata

in the state of Andhra Pradesh through district of Nellore, on one end to Obulavaripalle, the existing Station of SCR on Renigunta – Guntakal section on the Trunk Route of Chennai -Mumbai Trunk Route of passing through the district of Kadappa, Andhra Pradesh on the other end.

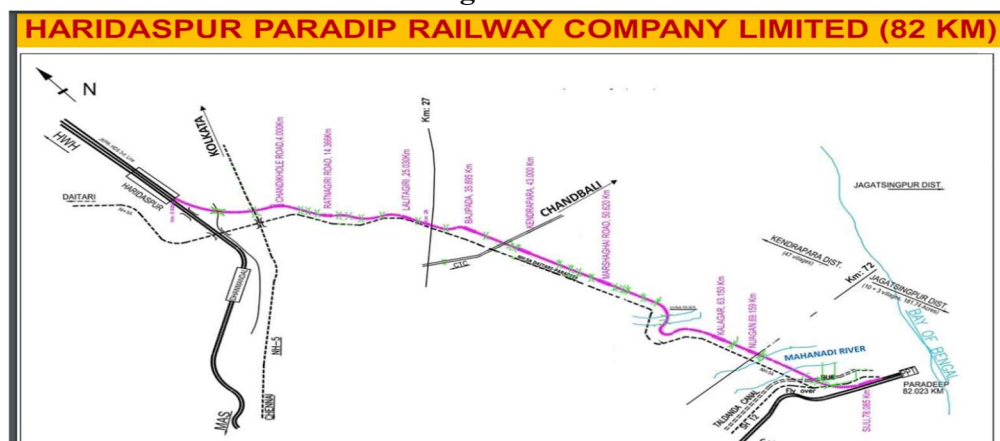
The 113 Kilometre Single Line/Electrified from Krishnapatnam to Obulavaripalle has been constructed under this project at a total cost of INR 1993 crore. The part of the project, i.e., from Venkatachalam/ Komarampudi to Krishnapatnam (24.5 kilometre) was completed on 15th November 2008, and the full project was commissioned on 3rd July 2019. Share Holders of the project are RVNL - 49.76%, Sagarmala Development Co. Ltd - 20%, NMDC - 6.4%, GoAP - 5.6%, KPCL - 12.96%, Bramhani Industries - 5.28% (Total INR 625 crore) The concession period is 30 years or till the time the NPV payback (@14% equal to equity investment reached.

Benefits to MoR: MoR constructed a 113 km line without any direct investment, connecting its existing rail network with Krishnapatnam Port. Timely connectivity to the Port resulted in the movement of 11-12 MT pa. The strength of BoD is 11, with 1 IR representative.

The Railway has handled 11.5 MT traffic during FY 2021-22 and earned revenue of INR 232 crore (AR- INR 202 crore, Terminal Charges- INR 30 crore). The total O&M cost incurred during 2021-22 was INR 38 crore (Reserved Services INR14 crore; Maintenance INR 24 crore). The maintenance Cost per km was INR 21 Lakh (Single Line/ Double Line), and part of the maintenance is done by JV itself. The railway has a debt liability of INR 63.97 crore as on 31.03.2022. The Railway has a debt liability of Bank loan outstanding INR 927.16 crore, and INR 1381.41 crore payable to RVNL towards outstanding construction of project including interest thereon.

(vi) Haridaspur – Paradip Railway Company Limited (HPRCL)

Figure-4.7



Haridaspur Paradip Railway Company Limited is a Special Purpose Vehicle incorporated in 2006 under the National Rail Vikash Yojana. The company was established with the vision of providing an alternative and robust rail connectivity between Haridaspur and Paradip, alleviating the congestion on the existing Cuttack-Paradip line. The primary aim of this railway project was to serve the burgeoning steel production hub at Kalinganagar and Jamshedpur, along with facilitating transportation of iron ore from the Banspani region.

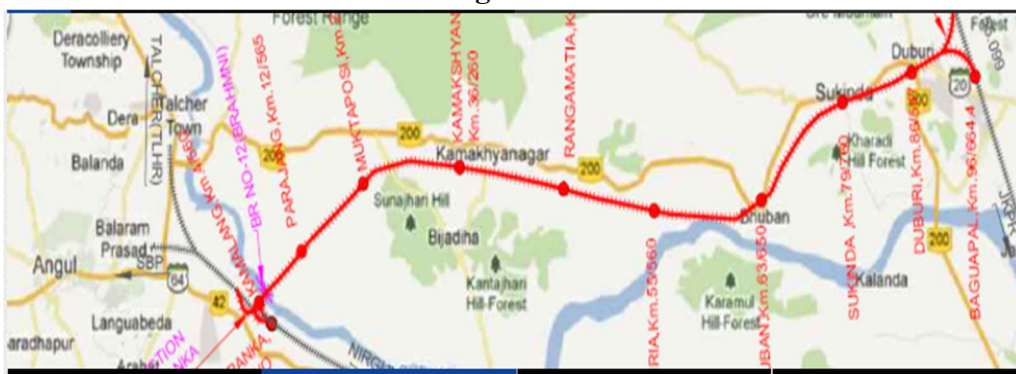
There was an existing BG single line from Banspani to Daitari which connects to the coastal line at Jakhapura and links the iron ore producing districts of West Singhbhum, Sundergarh, and Keonjhar into direct connectivity with the coastal line. The Haridaspur-Paradip line acts as the final extension of the Banspani-Daitari link and provides an alternative route to Paradip port.

The 82-kilometre Single Line/Electrified from Haridaspur – Paradip is constructed at Cost of INR 2681 crore with Commercial Operations Date of October 2020. Shareholders of the project are RVNL- 38.62%, Govt of Orissa- 22.49%, Paradip port- 10.56%, ESSEL- 4.73%, JSPL- 0.79%, Rungta- 4.73%, OMC- 14.64%, MSPL- 2.36%, SAIL- 0.79%, IDCO- 0.30% (Total INR 1300 crore). The Concession Period is 30 years or till the time the NPV payback (@14%) equal to equity investment reached.

Benefit to MoR: The 82-kilometre rail line constructed without any direct investment by MoR and additional connectivity to Paradip Port with expected movement of 25 MT traffic. The strength of BoD is 13 with 1 IR representative. The railway handled 23.63 MT traffic in FY 2021-22 and its Apportioned Revenue was INR 352 crore. O&M cost was INR 109 crore (Reserved services- INR 72 crore, Maintenance- INR.37 crore). Maintenance cost per km comes to INR 45 Lakh (Single Line). Debt Liability as on 31st March 2022 was INR 1200.03 crore.

(vii) Angul Sukanda Railway Limited (ASRL)

Figure 4.8



The Angul Sukinda Railway Limited was incorporated on 20th February 2009 under companies Act 1956 as Joint venture of Rail Vikas Nigam Limited, Government of Odisha, Container Corporation of India Limited, Jindal Steel & Power Ltd, Odisha Mining Corporation Ltd, and Odisha Industrial Infrastructure Development Corporation. Its corporate office is located at Bhubaneswar. The company has come up under the Indian Railway's policy initiative to develop rail-infrastructure under the Public Private partnership (PPP) mode of financing. The company has been mandated to construct, finance, operate, maintain and manage the proposed new rail line from Angul to Sukinda.

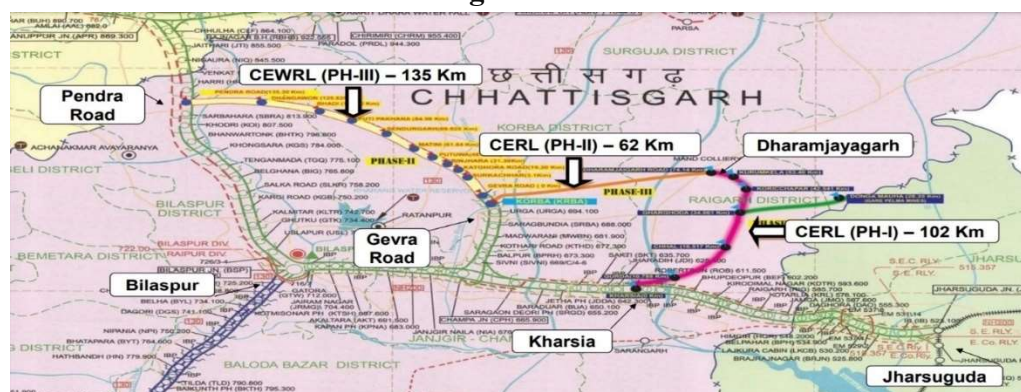
The 112.7-kilometre (Single Line/Electrified) line has been constructed at the cost of INR 2491 crore connecting Coal, Iron- Ore & Steel Industry with the rail network. The shareholding percentages are RVNL 32.37%, Jindal Steel 7.71%, Government of Odisha 21.89%, Odisha Mineral Corporation - 10.79%, Infrastructure Development Corporation of Odisha 0.54% and CONCOR 26.71%. The project completed in March 2023. The concession period is 30 years or till the time the NPV payback (@14%) equal to equity investment reached.

Benefits to MoR- The 112.7-kilometre rail line has been constructed without any direct investment by IR providing connectivity to Coal, Iron- Ore & Steel Industry. The connectivity has potential to bring 25 MT of additional traffic to the railway network. The strength of BoD is 13, with one IR representative (Chairman).

The project was commissioned in March 2023. Thus, no traffic was handled in FY 2021-22, and consequently, no revenue/ operation and maintenance expenses were incurred. The Railway has a debt liability of Loan from Bank INR 1373.42 crore and non-cumulative redeemable preference shares from Tata Steel INR 55 crore.

(viii) Chhattisgarh East Railway Limited (CERL)

Figure 4.9



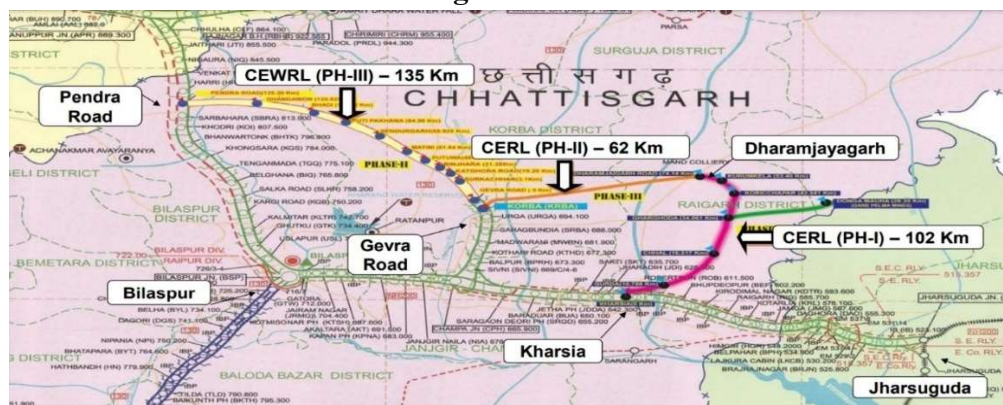
The Railway is constructing a 185-kilometre (Single-Line/Electrified) rail link between Kharasia-Dharamjaigarh—Ghargoda—Donga Mahua (122 kilometre) and Dharmjaygarh—Korba (63 kilometre) at a project cost of INR 5286.22 crore. Phase 1 of the project (CERL) was completed in July 2022, and phase -2 (CERL-II) is targeted to be completed in March 2026. The project shareholders are IRCON-26%, South-Eastern Coalfields Limited -64%, and Government of Chhattisgarh-10%. The concession period is 30 years.

Benefits to MoR: IR will get the 185-kilometer line without any direct investment, connecting the coal evacuation project in Chhattisgarh with the Rail network. The strength of BoD is 7, with one IR representative.

The Railway has handled 3.1MT traffic in FY 2021-22. And earned revenue of INR 37.37 crore (AR- INR 18.26 crore, Terminal Charges- INR 8.16 Cr, Inflated Mileage- INR 10.95 crore). The O&M Cost during FY 2021-22 were INR 16.5 crore (Reserved services INR 9.13 crore; Maintenance INR 7.36 crore). The Railway has a debt liability of INR 2252.31 crore as on 31st March 22.

(ix) Chhattisgarh East-West Railway Limited (CEWRL)

Figure 4.10



The Railway is constructing a 135-kilometre (Single line/Electrified) rail line between Gevra Road and Pendra Road at a project cost of INR 4970.11 crore connecting the coal evacuation project in Chhattisgarh with the existing rail network. The shareholders of the project railway are IRCON—26%, South-Eastern Coalfields Ltd—64%, and Government of Chhattisgarh—10%. The targeted date of completion is December 2024. The concession period is 30 years.

Benefits to MoR: The 135 Kilometre rail line between Gevra Road and Pendra Road is being constructed without any direct investment by MoR connecting the coal evacuation project in Chhattisgarh. The strength of BoD is 7, with one IR representative.

The project will be commissioned in December 2023. Thus, no traffic was handled in FY 2021-22, and consequently, no revenue/ O&M expenses were incurred. The Railway has a debt liability of INR 876.47 crore as on 31st March 2022.

(x) Mahanadi Coal Railway Limited (MCRL)

Figure 4.11



Mahanadi Coal Railway Limited was incorporated on 31st August 2015 as a joint venture of IRCON, Mahanadi Coalfield Limited and Industrial Development Corporation of Odisha and Construction of MCRL Phase I & II project has been identified as a high Impact project by the Ministry of Coal under Prime Minister's Gatishakti Plan.

The alignment of the project traverses through Angul district in Odisha. Angul and Jarapda are existing stations of Indian Railways network. Balram is existing loading station in Talcher –Balram private siding of MCL.

MCRL Phase-I (Angul-Balram) of 14 Kilometre length railway line will cater to evacuation of 25 MT coal from MCL mines in Talcher Coalfields. MCRL Phase-II (Balram-Jarapada-Tentuloi) of 54 Km will provide connectivity to allocated coal blocks on the southern side and central part of Talcher Coalfields. Phase-II is progressing rapidly, notification for Land acquisition and Forestry Clearances have been obtained. This railway line will cater to evacuation of coal from CIL & Non-CIL Coal Blocks in Talcher Coalfields ~58 MT.

Thus, MCRL rail corridor will be a game changer in the evacuation of coal from Talcher coalfields. The rail corridor will improve faster movement of coal rakes to Paradip and Damra ports thereby decongesting rail network, and this will also reduce transportation cost considerably. Shipping routes are much cheaper compared to rail network and improves coal availability in southern and western region of the country. The Railway is constructing a 68-kilometer (Single-Line/Electrified) rail line between Angul—Balram—Jarapada at a project cost of INR 1700.43 crore connecting the coal evacuation project in Odisha with the

existing rail network. The targeted completion date of the first phase (14 km) was November 2022. The concession period is 30 years.

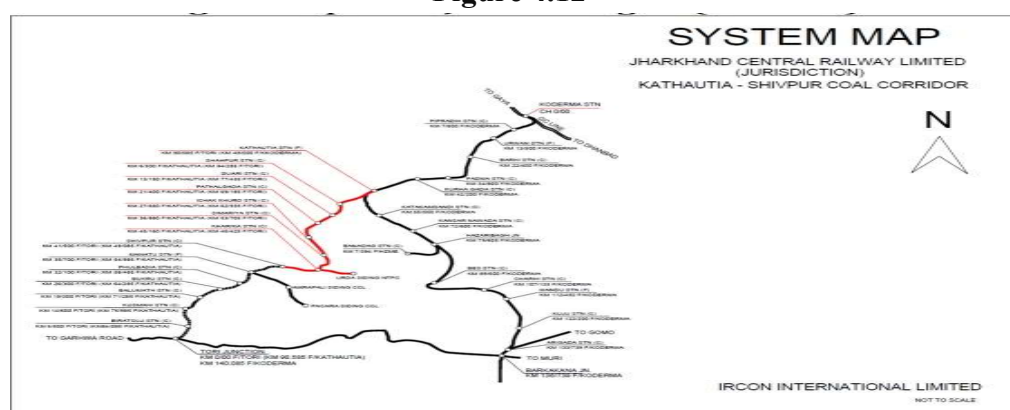
The shareholding 64% share of Mahanadi Coalfield Limited, 26% of IRCON and 10% share of Industrial Development Corporation of Odisha (IDCO)

Benefits to MoR: A 68-kilometer line will be constructed from Angul—Balram—Jarapada without MoR's direct investment, connecting the coal evacuation project in Odisha with the existing rail network. The strength of BoD is 7, with 1 IR representative.

No traffic was handled in FY 2021-22, and consequently, no revenue/ O&M expenses were incurred. The Railway has a debt liability of INR 397.64 crore as on 31st March 2022.

(xi) **Jharkhand Central Railway Limited (JCRL)**

Figure 4.12



The Railway is constructing a 49 km (Single-Line/Electrified) rail line between Shivpur and Kathautia at a project cost of INR 1799 crore connecting the coal evacuation project in Jharkhand with the existing rail network. The shareholders of the project railway are CCL—64%, IRCON—26%, and GoJ—10%. The targeted completion date of the first phase (14 km) was November 2022. The concession period is 30 years.

Benefits to MoR: A 49-kilometer railway line between Shivpur and Kathautia will connect coal evacuation plants with the existing rail network in Jharkhand without any investment by IR.

No traffic was handled in FY 2021-22, and consequently, no revenue/ O&M expenses were incurred. The Railway has a debt liability of INR 125 crore as on 31st March 2022.

Table 4.6: Profitability of rail infrastructure SPVs

JV	Projected IRR on Project Cost till the end of CA	Projected IRR on Equity till the end of CA	Total Dividend Paid (INR/ crore)
PRCL (2003)	7.87%	3.52 %	176.4
HMRDC (2006)	-6.00%	-1.80%	NIL

KUTCH (2006)	-1.90%	-4.83%	282 + 50 (Bonus)
BDRCL (2012)	6.40%	5.63%	3.10
KRCL (2008/2019)	-4.40%	4.70%	NIL
HPRCL (2020)	-5.87%	4.28%	28.60
ASRL (2023)	6.05%	4.21%	NIL

4.5.3 Cross case analysis of case studies on Rail infrastructure PPP JVs and discussions with stakeholders on Railway PPP policies, models and implications

The case studies reveal that all the above PPP projects have come up under Joint Venture Model with equity participation of Ministry of Railways or its subsidiary Public Sector Unit on one hand and stakeholders comprising the state, Port authorities, beneficiary Industries etc on the other. The JV have used mix of Debt and Equity for raising the finances for project. The shareholding of MOR/ its subsidiaries ranges from 26% (CERL, CEWRL, MCRL and JCRL), 30-40% (HMRDC, BDRCL, HPRCL) to 40-50% (PRCL, KRCL, KRC). The projects have been assigned on nomination basis to develop, design, finance, construct, own and operate the project and market freight services. The Concession Period is 30-32 years after which the project railway will be taken over by MoR. During concession period Ministry of Railways has right to run trains on the Project and project railway shall provide access to Railways. Railways, collect tariff from non-container freight traffic and haulage charges from container traffic. In certain cases, like PRCL, railway is also entitled to run the equivalent of passenger services that already operate on the track without paying any access charge to Project Railways. Tariff fixation rights vests in Railways. The project railways have to undertake operation and Maintenance (O&M) of the Project through nominated railway, for which the O&M charges to be fixed by Railways. IR shall pay to the JV apportioned revenue net of such cost as applicable, as per a pre-defined formula specified in the O&M agreement. Further the following common observations are taken from the discussions held with the higher management of the PPP project railways and railways:

(i) Lack of competitiveness:

The SPVs have been formed on a nomination basis at the stakeholders' request without following any tendering process. Therefore, the best offerings by PPPs are missing in the present model. Projects need to be awarded through a bidding process so that optimal financial benefits are drawn from them, and customers get the benefit of fair and competitive pricing of services.

(ii) Contractual Vagaries:

Terms and conditions of engagement between SPVs and IR are not clearly drafted at the beginning of the concession period. O&M agreements, in many cases, are still not finalized. The agreement lacks clarity on many important issues, e.g., regarding changes in tax laws giving room for subjectivity in case of disputes. Interpretation of agreement is also generally biased, with IR themselves being the regulator. Recently, Government of India (GOI)/ MoF has decided that the infrastructure provided by SPVs to IR shall be treated as business auxiliary service and thus subject to Service Tax. So far, the revenue shared by IR with SPVs for the infrastructure provided was not taxable. Since the agreement was silent on this aspect, on receipt of the MOF notification about the taxability of such revenues, IR decided that revenue shared with SPVs would be treated as inclusive of Goods and Service Tax (Appendix-10), having the impact of approximately Rs 360 crore p.a. on SPVs. The agreements are silent on dealing with such unforeseen eventualities, and there is a lack of expertise in contract management.

(iii) Lack of expertise

Lack of expertise in rail infra development in the private sector is a major barrier to infrastructure PPPs. In port connectivity projects in Indian Railways also, SPVs did not have contractors with the required calibre outside railways to handle EPC (engineering, procurement, and construction) and had to subcontract the work to railways, which prevented efficiency gains in PPPs. Eurotunnel project failed as the concessionaire lacked the management capability to handle project of such magnitude. This calls for developing expertise in various domains of PPP development and implementation.

(iv) Governance Issue

While the Concession Agreement of all 7 implemented JVs has been signed by MOR, direct equity contribution has been made only in two JVs, i.e., PRCL and HMRDC. In Five JVs (Pipavav Railway Corporation Limited, Haridaspur Paradip Railway Company, Kutch, Krishnapatnam and Bharuch Dahej Railway Company Limited) MoR has paid equity contribution through RVNL. In these JVs, MOR does not have any Director on BOD except the Chairman, with no Veto power. In JVs of RVNL –Project Development, estimate preparation and construction is done by RVNL. (Initial cost of Kutch Doubling approx INR 1600 crore enhanced to INR 2900 crore).

Any reform in SPV becomes difficult without MOR Directors on BOD. MoR in September 2018 decided that IR's nominee Director shall be included, one each, in the Board of these JV/SPVs. The Model Concession Agreement, based on the PPP policy of 2012, has a provision of 'Golden Share' in favor of MoR. An affirmative vote of the Director appointed by MoR shall be necessary and required for the passing of any resolution.

(v) Other operational Issues

The issue regarding making additional Investments and Passenger trains running is also often raised.

(vi) Traffic Risk allocation:

Traffic risks have been allocated to the SPVs in IR's PPP models. Therefore, the revenue source of IR's PPPs in the traffic-based concessionaire is fare box collection. Again, tariff fixation entirely vests in IR. In such arrangements, the revenue risks are very high for concessionaires since demand estimations are generally overestimated in DPR, and tariff structures are highly influenced by socio-political considerations. Case studies on IR's SPVs show that the above infrastructure rail PPP would not be able to recover capital investments only through traffic revenues and would require government support (viz VGF/ other subsidies). LR also suggests that rail PPP can't recover capital investments only through fare-box revenues and would require government support at times totalling more than 50% of the project cost (Dehornoy, 2012). Phang, (2007) revealed that fare-box revenues are insufficient to fully compensate for private infrastructure investments and must be addressed effectively in the PPP structure. For this, PPP policy should provide for direct subsidy, awarding an annuity, or combining the project with positive externalities like land development, etc.

(vii) Unilateral Tariff/ O&M charges fixation mechanism:

In the present regime, IR is both a Grantor as well as regulator. Further, the concessionaire has no say/ control over tariff structure/ fixation, which often are governed by socio-political considerations. The decision of IR in revenue apportionment/ tariff fixation/ skewed towards railways. O&M charges charged by Railways for operation and maintenance of the SPV track infrastructure are also fixed/ revised and enforced by IR on SPVs without any control over the process involved. From time to time, issues on O&M charges are raised by SPVs and Zones. Most of these pertain to Staff costs and Sources of Data. IR solely

decides these. This unilateral decision mechanism has also impacted the IRR of SPVs.

(viii) Lack of independent Regulator

Since, at present, IR is both a Grantor and a regulator, the decisions of IR in revenue apportionment/ tariff fixation/ interpretation of agreement are prejudiced. For instance, in the absence of an independent regulator, there is a long pending dispute between Krishnapatnam Rail Company Ltd. (KRCL) and IR, seeking the payment of Terminal Cost w.e.f. 2008 amounting to approx. INR 4,035 crore. Such instances dispel private investment. A clear, unbiased, and independent regulatory framework is essential to protect the rights and interests of various stakeholders for successful PPPs. (Pangotra & Raghuram, 1995), concluded that six areas, viz licensing, safety and security, pricing, service levels, environment, and dispute resolution, need to be regulated in a PPP. These need to be managed through a separate framework for each of them, viz. pricing/ economic regulation can be a contract, cost plus or price cap, etc. The presence of independent Regulatory authority is considered necessary for impartial decision-making and a level playing field for all stakeholders. In addition, an appropriate revenue risk allocation framework is needed to augment private investment in railway projects.

**(ix) Lack of government supportive policies, Unattractive tax regime-
Impact of GST laws on JV/SPVs:**

Land acquisition laws have cumbersome processes and often lead to delays in projects, leading to cost and time overruns. There is a lack of government-supportive policies in providing appropriate low-cost financial instruments for rail infrastructure projects. Govt. policy, conducive regulation and financial instruments for private investment is a must for attracting PPP projects. However, on the contrary, there is no such private investor-friendly / conducive tax structure, GST laws in particular. IR is paying GST on the final transportation product (identified Passenger/ goods services) @5% on fare/ freight collected from rail users (services). The Ministry of Finance (MoF) had legislated that IR and the SPV are distinct persons, and both revenues apportioned by IR to SPVs and O&M cost recovered by IR from SPVs would be taxable supplies to each other @18%. This decision had serious repercussions as summarised below:

- If GST along with applicable interest were made to be discharged by SPVs on User fees received from IR and also on O&M charges paid for the period

prior to the decision of the GST Council, the estimated financial impact would be Approx INR 3100 crore. Resultantly, SPVs would become bankrupt.

- IR would not be able to claim input tax credits to the full extent and as such this decision will further burden the IR financial position.
- IR and SPVs have been requesting MoF, highlighting the above facts for exemption of GST on apportioned revenue to SPVs and O&M cost recovered from SPVs.
- After prolonged persuasion, the GST Council in its 53rd meeting held on 22nd June 2024, has recommended to exempt GST on the services rendered to Indian Railway by Special Purpose Vehicles and vice versa. This would permit Indian Railway to utilize infrastructure that SPVs built and owned during the concession period, as well as maintenance services that Indian Railways provided to SPVs, without incidence of GST for the period from July 1, 2017, to the date of the exemption notification's issuance, while the issue for the past will be regularized "as is, where is basis." This will not only assuage the long pending grievance of SPVs but also go a long way to encourage private investment in railway infrastructure projects.

4.6 Issues of Rail Infrastructure SPVs

Data Triangulation using diverse data sources (e.g., surveys, interviews, archival records) to gather varied perspectives; Methodological Triangulation combining different research methods, such as surveys, focus groups, and case studies; Theoretical Triangulation applying multiple theoretical frameworks to interpret findings, and Investigator Triangulation involving supervisor and industry experts to analyze data and cross-check interpretations has been used to ensure validity and robustness of the analysis. The common issues having adverse implications for private participation and analysis thereof with reference to the Critical Success Factors of PPP projects emerged from triangulation and analysis of diverse Data sources, Literature Research, surveys, interviews and discussions with the stakeholders is summarised below:

4.6.1 Operational Efficiency factors:

- (i) Lack of competitiveness: (affected CSF- Stakeholder engagement)
- (ii) Contractual vagaries: (affected CSF-Lack of comprehensive agreement)
- (iii) Lack of expertise: (affected CSF- Lack of efficient project management & governance)

(iv) Governance Issues: (affected CSF- Lack of efficient project management & governance)

(v) Other operational Issues: (affected CSF-Stakeholder engagement)

4.6.2 Economic & Financial capability factors:

(i) Traffic risk allocation on Private party: (affected CSF-Risk Allocation & Sharing among stakeholders)

(ii) Unilateral Tariff fixation mechanism: (affected CSF-Effectiveness of a revenue sharing mechanism)

4.6.3 Legal & Regulation support factors:

(i) Lack of independent Regulator; (affected CSF- Conflict of interest/ Transparency & independence of regulatory authority, efficient dispute redressal mechanism)

(ii) Lack of government supportive policies, Unattractive tax regime- the impact of GST laws on JV/SPVs. (Extant State Government support in PPP initiatives)

The studies and discussions clearly indicate a need for improving the existing PPP models and policies taking into consideration the critical success factors of PPP projects in Railway infrastructure as discussed below.

Streamline Land Acquisition: Establish a dedicated mechanism for rail-specific land acquisition, with fast-track processes and fair compensation frameworks. Use technology like GIS for efficient land mapping and dispute resolution.

Simplify Bureaucratic Processes: Introduce a single-window clearance system for all railway PPP projects. Empower zonal and regional offices to make decisions faster, reducing dependency on central approvals.

Mitigate Political Risks: Develop a long-term, bipartisan policy framework for private participation in railways. Introduce safeguards against arbitrary policy changes.

Enhance Revenue Models: Allow private players greater flexibility in fare-setting, service differentiation, and advertising rights. Offer revenue guarantees or viability gap funding for high-risk projects.

Establish an Independent Regulator: Create a Railway Regulatory Authority to ensure fair competition, address grievances, and streamline regulatory compliance.

Promote Public Engagement: Build awareness campaigns to educate the

public on the benefits of private participation in railways. Engage with labor unions to address their concerns and ensure inclusive policymaking.

Revise PPP Contracts: Ensure equitable risk-sharing mechanisms and clear dispute resolution clauses. Offer innovative financing options such as long-term bonds, infrastructure trusts, or sovereign guarantees.

While Indian Railways has significant potential to attract private investment, systemic reforms are necessary to address persistent challenges. By streamlining processes, ensuring policy stability, and fostering investor confidence, IR can unlock the benefits of private participation, enabling faster modernization and enhanced service quality.

Chapter 5

Recommendations and Conclusions

The analysis drawn from the survey and the findings arrived at from the case studies discussed in Chapter 4 reveals that the lack of conducive policy initiatives and alleged lack of a level playing field is proving to be a dampener for the Rail-Infrastructure PPPs. The grievances redressal mechanism is also tilted in favour of Railways. It also stresses the necessity for compliance with critical success factors in the PPP policies and models including an independent regulatory regime to ensure neutral balanced decisions in the interest of developing the sector.

Presently, the Railways have centralised all the roles with themselves and act as policymakers, owner of infrastructure, operators, tariff setters and regulators. An independent regulatory body is necessary to preserve fairness in decision-making, level the playing field, and safeguard the interests of all parties involved, including end users.

Given the vast potential for infrastructure finance by the private sector, this industry must grow, and both Railways and Government of India must act quickly to revisit and fix existing policies. These should include conducive financing tools and reforms related to land acquisition. The PPPs should be treated as Partners rather than mere investors. In addition to bringing in more funding for the Railways, this will also boost public trust in their ability to support PPP projects. In spite of slow progress so far and continuing grouses, there are emerging opportunities for implementing PPP projects in railway in view of the present government's initiatives for private participation in Rail infrastructure projects under NIP etc. There is newfound optimism that the industry will recover due to positive economic reforms and legislative changes. Based on a comprehensive and essential evaluation of the industry's prospects and issues in light of past PPP project experiences in India and worldwide, the following recommendations are made:

5.1 Recommendations

- To restore trust and encourage more private investment in railway infrastructure projects, the Railway Administration must revise restrictive

PPP policies and models in consultation with railway SPVs. It is necessary to shift the perception of Railways as dictating policies to that of a handholding partner.

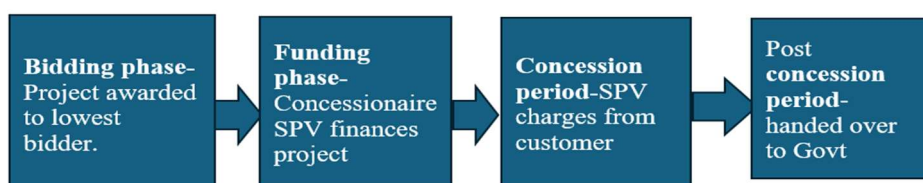
- An impartial and independent regulator is imminently needed to address problems related to costs, quality of service, fairness in the marketplace, inconsistent policies, etc. IR needs to assess and revisit its various functions as an operator, regulator, and licensor.
- It is necessary to study and deliberate on the viability of implementing clear roles and responsibilities, non-discriminatory rights for rail infrastructure, competitive access to PPPs, and capacity allocation policies- all of which are widely accepted reform practices in the European Union's member states to varying degrees. These need to be studied and deliberations for exploring the feasibility of implementation in the Indian context by IR.
- While it is necessary to review and revise the model concession agreement in collaboration with the stakeholders in order to dispel the general perception that these are arbitrary and biased, it is equally important that once finalized, these should be honoured in letter and spirit.
- The private operators should consider methods of resource sharing, consolidation, and other strategies by upgrading their technology and services, expanding their network, and providing composite solutions.

Further, the following changes are recommended in the rail PPPs policies and models keeping in view the critical success factors arrived at in the studies viz, appropriate risk allocation among stakeholders, effectiveness and transparency of revenue sharing mechanism, independence of regulatory authority, efficient dispute redressal mechanism, extent of state government support in PPP initiatives) stakeholder engagement, Comprehensive agreements, efficient project management and governance, to build an ideal sustainable model for rail infrastructure PPPs:

5.2 Suggested Model for New SPVs

5.2.1 Capex Substitution Model

Figure 5.1 (Researcher's own creation)



- (i) The entire capital investment in the infrastructure project is financed by SPVs.
- (ii) The Concession period may be fixed for the project (say 30 years), extendable further as per mutually agreed terms and performance.
- (iii) Selection for grant of concession may be done through a techno-financial bidding process, instead of nomination at present, to achieve the benefit of fair and competitive pricing of services.
- (iv) Bidder may be allowed to quote x% above/ below the standard railway freight rates to be carried on SPV infrastructure.
- (v) The right to fix tariff for using the SPV infrastructure may be given to the SPVs, based on the cost of services.
- (vi) Accordingly, x% above/ below the Standard Freight rate chargeable by IR, for the SPV line shall be charged directly by SPV – (x being the bid parameter). Invoice shall be generated in the name of SPV (instead of IR) to avoid double taxation under the GST rules.
- (vii) IR may charge for the railway portion separately by issuing railway RR. Charges are collected at a single point (HUB and SPOKE MODEL) a single interface for customers.
- (viii) Alternatively, the railway may calculate freight for the entire journey and charge freight from the customer giving a concession equivalent to the SPV invoice value- extending the benefit of telescopic rates-charges collected at a single point.
- (ix) The differential of railway freight and SPV freight may either be passed on to the customer or absorbed by IR as VGF support/ non-recourse financing.
- (x) Periodical truing- up mechanism may be provided for in the agreement for sharing of loss/ gains from extra-ordinary variation in stipulated (in bid) vis a vis actual loading, beyond agreed percentage. A decision could also be taken to pass on a part of the gains in such cases, if any, to the end customer.
- (xi) An independent Tariff setting, truing up guidelines & Review mechanism may be put in place with appropriate indexation along with a robust grievance redressal forum under an independent regulator.
- (xii) Standardization of agreements covering provisions to handle unforeseen eventualities, viz change in tax laws etc., duly considering the experience gained so far and the standards across the globe, need be ensured.
- (xiii) Supportive government policies may be legislated to ensure land acquisition

reforms, cheaper financing products for infrastructure projects, and favourable tax regimes for a supportive eco-system.

(xiv) A proper Transit Oriented Development regime needs to be put in place that shares benefits with SPVs and IR.

(xv) The position is explained in the table below (table 5.1):

Table 5.1 Calculation of Freight INR/ KM Tonne (by SPV for bidding)

S.N o.	Particular	Amount
A	Operation and Maintenance (O&M) Cost (INR crore)	80.00
B	Finance Cost (INR/ crore)	49.00
C	Depreciation/Amortization (INR crore)	33.33
D	Return on Equity (ROE) (INR crore)	36.00
E	Total (A+B+C+D) (INR crore)	198.33
F	Total Freight Carried (KM Tonne)	1,000,000,000
G	Freight charges INR/KM Tonne (E/F)	1.9833
H	Revenue from Other sources 2% (INR/KM Tonne)	0.0397
I	Net Freight Charges INR/KM Tonne (G-H)	1.9437
J	Railway rate as per Budget Estimation for FY 2023-24 is (INR/KM Tonne)	1.9063
K	Difference VGF/Pass on to the customer (I-J)	0.04
L	Total Amount of VGF/Pass on to Customer (KxF) (INR/ crore)	3.74

Here

A=	Actual O&M incurred by IR for 1,000 Million Tonne KM of Freight.
B=	Here Finance cost means Interest Cost on Capex Funding and Interest on Working Capital.
C=	Here Depreciation/Amortization means the total CAPEX incurred for infrastructure divided by the number of years of Life of the Infrastructure.
D=	Here ROE is the return expected by the SPV for the Equity Infused.

Example

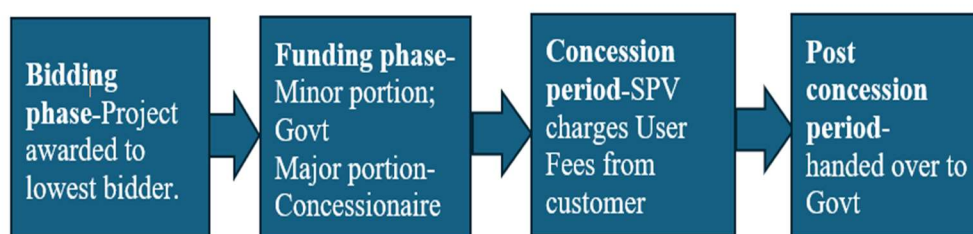
Assumptions

Total Million Tonnes Freight Carried per Annum	10
Total KM	100.00
Total Million Tonnes KM Freight Carried per Annum	1,000
Total Infrastructure cost (Capex Cost) (@ INR 10 crore per KM) (INR crore)	1,000.00
Life of Asset in Years	30

Debt Equity Ratio (Industry Practice)	70:30
Interest Rate (1 Year MCLR) for Debt Cost	7.00%
ROE rate	12.00%
O&M Cost for IR for 1 year (INR crore) 8% of Capex Cost	80.00
Depreciation per Year (INR crore)	33.33
Debt for Capex (INR crore)	700.00
Per Year Interest cost for Capex (INR crore)	49.00
Equity infused for Capex (INR crore)	300.00
Per Year ROE (INR crore)	36

5.2.2 VGF ENABLED PRIVATE INVESTMENT MODEL:

Figure 5.2 (Researcher's own creation)



- (i) Upfront grant of certain percentage of CAPEX may be provided as financial support to the SPV for infrastructure project.
- (ii) The SPV may arrange remaining CAPEX for infrastructure project from its own resources (Debt/ Equity)
- (iii) Selection for grant of concession may be done through bidding process.
- (iv) SPV may be allowed to fix Direct User charge (per tonne) (Capacity Augmentation Fee) from the customer. Separate invoices be issued by SPV to avoid double taxation.
- (v) The per tonne rate to be charged by SPV may be the Bid parameter (lowest bidder may be awarded concession)
- (vi) In case IR wishes to recover CAPEX, the same may be recovered by levy of inflated mileage charges from customers for SPV portion of traffic or absorb as VGF/ non-recourse financing.
- (vii) The end-to-end freight of IR may be charged from the customer and the concession equivalent to the SPV invoice value given by IR

5.3 Suggested Model for Existing SPVs

For the existing SPVs the restructuring model should be revenue neutral to SPVs and at the same time should not lead to windfall/additional gains to railways/

SPVs while preventing the cascading effect of taxation.

This can be achieved by HUB and SPOKE MODEL as under:

- (i) SPV may be allowed to charge X% of the freight for SPV line through GST invoice by SPV to customer.
- (ii) The RR of IR from end to end may allow concession equivalent to invoice amount (Base fare) for the SPV.
- (iii) The % (x as mentioned above) may be adjusted each year depending on actual operational cost and freight revenue- to ensure neutrality with the current model.
- (iv) Maintenance charge to be levied by IR on an actual basis, wherever IR is providing maintenance facility.

5.4 Validation of the proposed framework

Framework validated in IR- India Post JPP model. The concept of the Hub and Spoke model for composite supply of service charging different rates as per cost is under testing on IR, which validates the proposed model. The Ministry of Railways notification and copy of the composite invoice are presented in Figure 5.3 and 5.4

Figure 5.3 (Appendix-11)

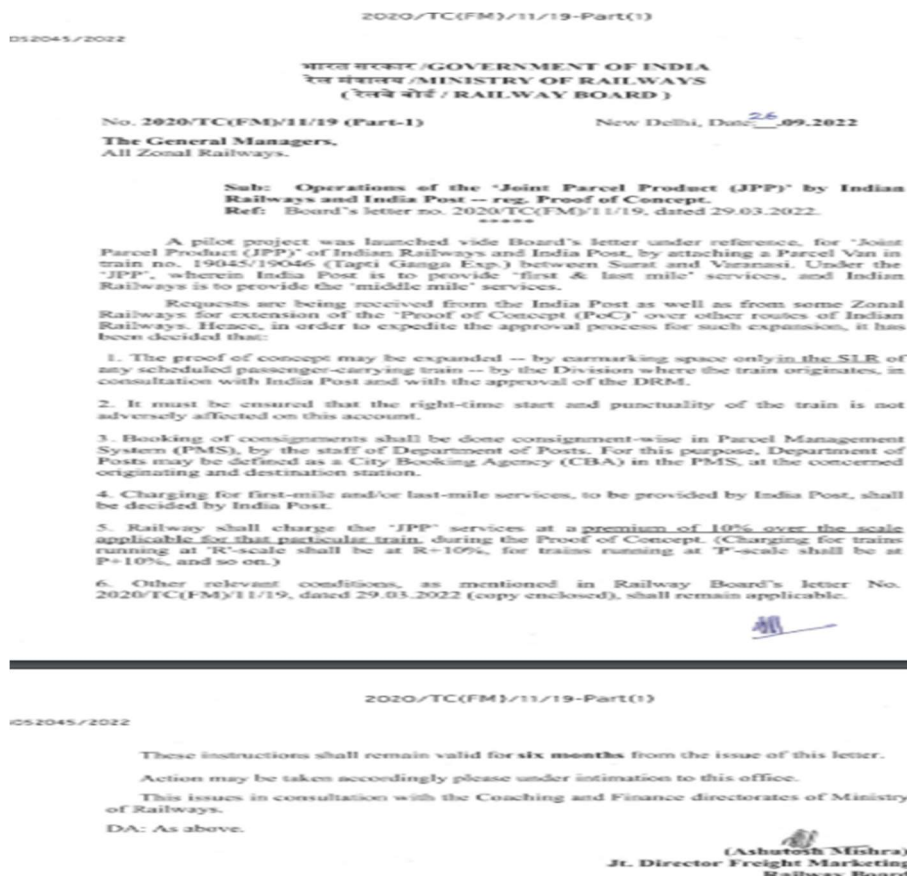


Figure 5.4 (Appendix-12)

Order Invoice**RAIL POST GATI SHAKTI CARGO EXPRESS SERVICE**

User Name	ashish.pmscris		
User Mobile	8130797622		
Order ID:	I00ST2205001		
Pickup Location	ghjkl, PIN 395001 Nearest Railway Station ST		
Delivery Location	hgj, PIN 221005 Nearest Railway Station BSB		
Distance:	1378.00 Kms.		
Type of Service Required:	Both		
Type of Charges	Prices	GST Applied	Overall Charges with GST
Railway charges:	Rs.10560.00	Rs.528.00	Rs.11088.00
Postal charges:	Rs.11440.00	Rs.560.00	Rs.12012.00
Insurance charges:	Rs.7.50	Rs.1.35	Rs.9.00
Total charges:	Rs. 23109.00 /-		
Payment Method:	online		
Payment Gateway:	123		
Gateway ID:	I00ST2205001		
MR Number:	9000000328		
Railway Invoice Number:	PR24WR9000000328		
Postal Invoice Number:	IP24WR9000000328		
Payment Status:	Paid		
Payment Status Date:	22-05-2024 17:41:18		
Order Status:	Accepted		
Order Placed on	22-05-2024 17:37:03		
Service Date:	23-05-2024		

This is computer generated receipt dated : 22-05-2024

5.5 Potential benefits, risks and risk mitigation strategies for the proposed models:

The potential benefits can be summarized as under:

- (i) **Reduced Financial Burden on Government:** Private entities finance, construct, and operate the project, reducing the immediate fiscal pressure on the government.
- (ii) **Access to Private Sector Expertise:** The involvement of private players brings in advanced technology, efficient project management, and operational expertise.
- (iii) **Timely Completion of Projects:** Private companies are incentivized to complete projects on time to start earning revenues, mitigating delays often seen in government-led projects.
- (iv) **Enhanced Efficiency:** Private operators aim for cost-efficiency and optimal resource utilization, leading to better project outcomes.
- (v) **Risk Transfer to Private Sector:** Key risks such as construction delays, cost overruns, and operational inefficiencies are borne by the private partner.
- (vi) **Improved Service Quality:** Competition among private entities can lead to better quality infrastructure and services, benefiting end users.
- (vii) **Long-term Revenue Sharing:** Once the concession period ends, the government receives a fully operational project and may continue earning

revenue.

The potential risks include:

- (i) high initial costs, which might discourage some private players,
- (ii) revenue risks if projected traffic falls short, private operators may face revenue deficits, potentially leading to project failure,
- (iii) involvement of intricate contractual agreements and poorly designed agreements can lead to disputes or unfavorable terms for either party,
- (iv) frequent policy changes, lack of clear regulations, or delays in approvals can hinder project execution, land acquisition,
- (v) resettlement, and environmental clearances may pose challenges, leading to delays or protests,
- (vi) users may perceive higher fares or limited access under private management, causing dissatisfaction,
- (vii) private entities might prioritize profitability over broader public welfare, affecting inclusivity and affordability, etc.

These models can significantly accelerate railway infrastructure development in India if structured well, leveraging private sector efficiency while addressing public welfare concerns. Key strategies to mitigate the challenges include clear regulatory frameworks, appropriate risk-sharing with periodical truing-up mechanisms, and robust project monitoring, etc.

5.6 Theoretical contribution

Contract theory focuses on how parties can design agreements to mitigate risks, align incentives, and ensure efficient outcomes in situations where there is uncertainty or incomplete information. The current research extends an important contribution to Contract theory explaining causal inter-relationships between risk allocation, alignment of incentives, efficient operational ecosystem and success of the project which can help in structuring agreements and models between the public sector (government) and private sector (investors, developers, operators) to deliver infrastructure projects effectively and sustainably. By applying insights from the research, Indian Railways can design PPP models that promote sustainability, efficiency, and accountability in the development and operation of railway infrastructure, ultimately benefiting passengers, taxpayers, and the wider economy. The suggested PPP model has been framed accordingly.

Stakeholder theory is a framework used in business and management that

suggests that organizations should consider the interests of all stakeholders. The current research highlights the concerns and interests of the stakeholders in the railway infrastructure projects and the causal impact on stakeholders' participation. The stakeholder perspectives and principles of sustainability are essential to design and implement a successful PPP model. Application of the insights gained from this research can be used to develop an ideal sustainable Public-Private Partnership (PPP) model for Indian Railways (IR) infrastructure considering the interests and concerns of various stakeholders involved in the PPP infrastructure projects of the railway sector.

Agency theory provides the framework that ensures alignment of stakeholder interests, reduces inefficiencies and project delays, and balances public service objectives with private profitability. By structuring PPP agreements that address agency problems through clear contracts, aligned incentives, and robust monitoring, railway infrastructure projects can achieve sustainable success.

Research on the critical success factors (CSFs) of Public-Private Partnership (PPP) infrastructure projects in Indian Railways also contributes to both contract and stakeholder theories by identifying key elements that are essential for the successful implementation of such projects. Additionally, it offers insights into how these CSFs interact and influence project outcomes, thereby guiding policymakers, practitioners, and researchers in enhancing the effectiveness and sustainability of PPP initiatives within the Indian Railways context.

5.7 Practical implications

The suggested model demonstrates the causal relationships between pertinent critical success factors that have been gleaned from primary research and literature. This could aid in focusing organisational attention and resources on more important areas, which would enable the PPP rail infrastructure project's objectives to be effectively fulfilled. Apart from its theoretical and methodological contributions, this study generates a list of important success variables that may be easily adapted and utilised for future research on PPP rail infrastructure project implementation.

This also explores mechanisms for effective stakeholder engagement and collaboration throughout the project lifecycle to foster PPP eco-system.

5.8 Scope for Future Research

The conclusions drawn in the study are based on the PPP models and policies prevalent in India only. The eco-system of PPP differs from country to country

and also across the sectors.

Detailed modelling and benchmarking of PPP models and standardization of Concession and Operation and Maintenance agreements for IR's PPP infrastructure projects can be the areas for further research in this field. The researcher can attempt to study the policy changes necessary to facilitate standardization of the concession and O&M agreements in IR, revenue-sharing models in PPP agreements to optimize and balance government revenue interests with private sector profitability, optimal structures for PPP agreements in terms of duration, revenue-sharing, and investment obligations for rail infrastructure, exploring additional revenue sources and models for rail infrastructure projects etc.

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List of Publications

- Sharma, S., Kandpal, V., and Gonzalez, E.S. (2024): A Comprehensive Review of Indian Railways Freight Business: Strategies for Regaining the Lost Ground and Future Prospects, Case Studies on Transport Policy (<https://doi.org/10.1016/j.cstp.2024.101195>)
- Sharma, S., Kandpal, V., Choudhary, T., Gonzalez, E.S. and Agarwal, N. (2023): Assessment of the implications of energy-efficient technologies on the environmental sustainability of rail operation- AIMS Environmental Science, 2023, 10(5): 709-731. doi: 10.3934/environsci.2023039 (<https://www.aimspress.com/article/doi/10.3934/environsci.2023039>)
- "The Looming Storm: Pension Liabilities and the Impending Financial Crisis in the Railway Sector" accepted for publication in the International Journal of Business Excellence with Dr Saurabh Tiwari and Dr. Vinay Kandpal.
- Dhingra, T and Sharma, S. (2022): Rail Infrastructure—Journey Since Indian Independence and Beyond, Springer's Book- Infrastructure Planning And Management in India, (https://link.springer.com/chapter/10.1007/978-981-16-8837-9_4)

Investment in IR infrastructure

Financing of Railways' Plan under each Plan Period

(INR' in crore)																						
Plan	Internal Resources		Borrowings through					Total Internal and Extra-budgetary Resources		Safety Funds (Created in 2001-02)						Capital from General Exchequer		Total	Total Fund from General Exchequer incld. SRSF #			
			I.R.F.C. (inclding for RVNL)+EB RIF		BOL T, OY W, WIS & PPP	Total						R.S. F. @	S.R.S.F.		Total							
	Amt.	%age	Amt.	%age		Amt.	Amt.	%age	Amt.				%age	Amt.	Amt.	Amt.	%age		Amt.	%age	Amt.	%age
I	280	66%							280	66%							142	34%	422	142	34%	
II	467	45%							467	45%							576	55%	1043	576	55%	
III	545	32%							545	32%							1140	68%	1685	1140	68%	
IV	397	28%							397	28%							1031	72%	1428	1031	72%	
V	384	25%							384	25%							1141	75%	1525	1141	75%	
VI	2783	42%							2783	42%							3802	58%	6585	3802	58%	
VII	7089	43%	2520	15%		2520	15%	9609	58%								6940	42%	16549	6940	42%	
VIII	18832	58%	5565	17%	596	6161	19%	24993	77%								7313	23%	32306	7313	23%	
IX	15737	34%	12947	28%	1056	14003	31%	29740	65%	140	1000	434	1574	3%	14411	32%	45725	15411	34%	45725	15411	34%
X	25871	31%	16657	20%	30	16687	20%	42558	51%	1153	9789	3697	14639	17%	26573	32%	83770	36362	43%	83770	36362	43%
XI	66317	35%	46086	24%	892	46978	25%	113295	59%	4326	1165	232	5723	3%	71824	38%	190842	72989	38%	190842	72989	38%
2012-13	9531	19%	15142	30%		15142	30%	24673	49%	1578	..	..	1578	3%	24132	48%	50383	25710	51%	50383	25710	51%
2013-14	9709	18%	15225	28%	..	15225	28%	24934	46%	1983	..	..	1983	4%	27072	50%	53989	29055	54%	53989	29055	54%
2014-15	15347	26%	11044	19%	..	11044	19%	26391	45%	2206	..	..	2206	4%	30121	51%	58718	32327	55%	58718	32327	55%
2015-16	16845	18%	23985	26%	15081	39066	42%	55911	60%	2601	..	..	2601	3%	35008	37%	93520	37608	40%	93520	37608	40%
2016-17	12125	11%	25745	23%	26834	52579	48%	64704	59%	10732	..	..	10732	10%	34500	31%	109935	45232	41%	109935	45232	41%
Total - XII	63557	17%	91141	25%	41915	133056	36%	196613	54%	19100	--	--	19100	5%	150832	41%	366546	169933	46%	366546	169933	46%
2017-18	3070	3%	33382	33%	22116	36452	36%	58568	57%	11375	..	..	11375	11%	32043	31%	101986	43418	43%	101986	43418	43%
2018-19	4663	3%	51595	39%	24281	75876	57%	80539	60%	13000	..	..	13000	10%	39838	30%	133377	52838	40%	133377	52838	40%
2019-20	1686	1%	66292	45%	12609	78901	53%	80587	54%	16886	--	--	16886	11%	50592	34%	148064	67477	46%	148064	67477	46%
2020-21	2062	1%	107261	69%	15935	123196	79%	125258	81%	-3	--	--	-3	0%	29926	19%	155181	29923	19%	155181	29923	19%
2021-22	1694	1%	60678	32%	10388	71066	37%	72760	38%	11105	--	--	11105	6%	106402	56%	190267	117507	62%	190267	117507	62%
2022-23	3400	1%	30239	15%	11086	41325	20%	44725	22%	30001	--	--	30001	15%	129256	63%	203982	159257	78%	203982	159257	78%

IRFC: Indian Railway Finance Corporation, EBR: Extra Budgetary Resources, IF: Institutional Finance, OYW: Own Your Wagon Scheme, WIS: wagon Investment Scheme, RSF: Railway Safety Fund, SRSF: Special Railway Safety Fund, RRSK: Rashtriya Rail Sanraksha Fund

Source Indian Railway's Budget Documents

Throw-forward in Capex

(INR in crore)

	PLAN HEAD	THROWFORW ARD 2014-15 (into 2015-16)	THROWFORW ARD 2021-22 (into 2022-23)	THROWFORW ARD 2023-24 (into 2024-25)
11	NEW LINES (CONSTRUCTION)	1,23,465	1,39,226	5,04,588
14	GAUGE CONVERSION	21,956	7,198	5,365
15	DOUBLING	35,783	1,67,100	2,17,084
16	TRAFFIC FACILITIES – YARD REMODELLING AND OTHERS	4,881	32,818	57,445
17	COMPUTERISATIO N	1,066	3,162	3,463
18	RAILWAY RESEARCH	165	681	852
29	ROAD SAFETY WORKS – LEVEL CROSSINGS	928	2,667	2,940
30	ROAD SAFETY WORKS – ROAD OVER/UNDER BRIDGES	38,493	45,401	75,311
31	TRACK RENEWALS	11,454	46,665	58,220
32	BRIDGE WORKS	2,001	8,714	21,724
33	SIGNALLING AND TELECOMMUNICA TIONS	5,664	43,118	54,432
35	ELECTRIFICATION PROJECTS	5,477	8,900	30,903
36	OTHER ELECTRICAL WORKS including TRD	2,613	4,063	14,051
41	MACHINERY & PLANT	2,158	2,440	4,993
42	WORKSHOPS INCLUDING PRODUCTION UNITS	14,575	22,715	34,547
51	STAFF QUARTERS	1,001	2,706	4,692
53	PASSENGER AMENITIES	1,757	13,898	1,23,503
64	OTHER SPECIFIED WORKS	1,322	10,182	12,074

65	TRAINING/HRD		1,153	1,089
81	METROPOLITAN TRANSPORT PROJECTS	19,655	54,204	53,288
		2,94,413	6,17,011	12,80,566
		<i>*Excludes works costing less than INR 2.5 crore each</i>		
		<i>*Excludes planheads Rolling Stock and Investment in PSUs/JVs/SPVs and Lease payments</i>		
21	ROLLING STOCK	1,58,896	3,15,059	6,71,892
	Total	4,53,309	9,32,070	19,52,458

Source Indian Railway's Budget Documents

Physical performance, Productivity of Indian Railways

Year	Route KMs	Electrification in Kms	Railway Stations in Nos.	PKMS in Billions	NTKM In Billions	No. of originating passenger in millions	Tonnage originating in millions
1950-51	53596	388	5976	66.517	37.56	1284	73.2
1960-61	56247	748	6523	77.665	72.33	1594	119.8
1970-71	59790	3706	7066	118.12	110.69	2431	167.9
1980-81	61240	5345	7035	208.55	147.65	3613	195.9
1990-91	62367	9968	7100	295.64	235.78	3858	318.4
2000-01	63028	14856	6843	457.02	312.37	4833	473.5
2010-11	64173	19607	7133	978.5	625.72	7651	921.73
2015-16	66252	23555	7216	1143.04	654.48	8107	1101.51
2016-17	66918	25367	7309	1149.84	620.18	8116	1106.15
2017-18	66935	29228	7318	1177.7	692.92	8283	1159.55
2018-19	67415	34319	7321	1157.17	738.52	8286	1221.48
2019-20	67956	39329	7325	1050.73	707.66	8086	1208.41
2020-21	68103	44802	7337	231.13	719.76	1250	1230.94
2021-22	68043	50394	7308	590.22	871.8	3519	1415.87
2022-23	68584	58074	7300	958.92	959.6	6396	1509.1
Analysis 2018-19	126%	8845%	123%	1740%	1966%	645%	1669%
2019-20	127%	10136%	123%	1580%	1884%	630%	1651%
2020-21	127%	11547%	123%	347%	1916%	97%	1682%
2021-22	127%	12988%	122%	887%	2321%	274%	1934%
2022-23	128%	14968%	122%	1442%	2555%	498%	2062%

Source:

1. Indian Railways Year Books from 1950-51 to 2022-23
2. Indian Railways Annual Report and Accounts from 1950-51 to 2022-23
3. Annual Statistical Statements of Indian Railways from 1950-51 to 2022-23

Financial Performance in Indian Railway

Year	Gross Revenue INR in Crores	Working Expenses incl. Depreciation etc and Misc Exp	Net Revenue INR in Crores	Dividend to General Revenues and payment to States in lieu of tax on passenger fares	Excess/ Shortfall	Return on Investment in %	Operating Ratio in %
1950-51	263.3	215.74	47.56	32.51	15.05	5.75	81
1960-61	460.42	372.55	87.87	55.86	32.01	5.77	78.75
1970-71	1006.95	862.22	144.73	164.57	-19.84	4.35	84.13
1980-81	2703.48	2575.99	127.49	325.36	-197.87	2.09	96.07
1990-91	12451.55	11337.77	1113.78	938.11	175.67	6.91	91.97
2000-01	36010.95	34969.72	1070.23	307.64	763.59	2.49	98.34
2010-11	96681.02	90334.88	6346.14	4941.25	1404.89	4.43	94.59
2015-16	168379.6	149151.13	19228.4	8772.51	10505.9	7	90.5
2016-17	165382.4	160469.48	4913		4913	1.62	96.5
2017-18	178929.6	177264.03	1665.61	-	1665.61	0.51	98.4
2018-19	190507.3	186733.51	3773.86		3773.86	1.08	97.29
2019-20	174694.6	173105.07	1589.62	-	1589.62	0.29	98.36
2020-21	140783.5	138236.07	2547.48		2547.48	0.66	97.45
2021-22	191367.0	206391.59	-		-		107.39
2022-23	240176.9	237659.58	2517.38		2517.38		98.10
Analysis	723.5	865.5	79.3	269.84 fold (2015-16)	250.8		
2018-19	663.5	802.4	33.4		105.6		
2019-20	663.5	802.4	33.4		105.6		
2020-21	534.7	640.8	53.6		169.3		
2021-22	726.8	956.7	-315.9		-998.3		
2022-23	912.2	1101.6	52.9		167.3		

Note: Dividend abrogated from 2016-17

Source:

1. Indian Railways Year Books from 1950-51 to 2022-23
2. Indian Railways Annual Report and Accounts from 1950-51 to 2022-23
3. Annual Statistical Statements of Indian Railways from 1950-51 to 2022-23
4. Operating Ratio during 2019-20 would have been 114.19% and 131.55% in 2020-21, had required level of appropriation to Pension Fund was made during the year

Assets on Indian Railways

Year	Capital at Charge (INR in crore)	Total Investment (INR in crore)
1950-51	827.0	855.2
1960-61	1520.9	1868.6
1970-71	3330.3	4099.4
1980-81	6096.3	7448.4
1990-91	16125.8	22200.5
2000-01	43051.88	63341.01
2010-11	143220.57	231615.25
2011-12	161447.97	257958.35
2015-16	275135.23	419123.61
2016-17	302457.78	471776.39
2017-18	324725.64	517324.19
2018-19	348601.77	573641.66
2019-20	374921.58	640408.27
2020-21	387689.69	670725.28
2021-22	466718.71	809918.59
2022-23	572920.19	972734.18
Increase since 1950-51	692.77	1137.43

Source:

1. Indian Railways Year Books from 1950-51 to 2022-23
2. Indian Railways Annual Report and Accounts from 1950-51 to 2022-23
3. Annual Statistical Statements of Indian Railways from 1950-51 to 2022-23

Social Service Obligation on Indian Railways

S.N o	DESCRIPTI ON	2011 -12	2012 -13	2013 -14	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20	2020 -21	2021 -22	2022 -23
i.	Loss on low rated commodities	57	37	53	69	41	42	60	60	301	1371	1691	781
ii.	Concession in passenger fare	921	1045	1313	1423	1603	1670	1810	1995	2059	38	107	236
iii.	Losses on account of EMU Suburban Services	2814	3365	4027	4679	5125	5324	6184	6754	6938	7799	8316	7842
iv.	Losses on uneconomic branch lines	1366	1466	1681	2056	1895	1855	2042	2342	2397	2255	2527	2379
v.	Losses on strategic lines	733	904	954	1138	1225	1450	1797	1815	1604	1280	2250	2413
vi.	Losses on Parcel, Luggage, Postal and Catering services etc.	2807	2894	3346	3469	3808	3705	4729	5278	5793	6113	6231	6741
vii.	Losses on account of pricing of fares below cost and other social service obligations	15291	17156	20746	20726	22262	25561	31128	37673	45431	57187	51138	41425
viii.	Total losses on Coaching and Goods Services (i. to vii)	23989	26868	32120	33560	35959	39607	47751	55917	64523	76043	72260	61817
ix.	Total Social Service Obligation (viii. – vi.)	21182	23974	28774	30091	32151	35902	43022	50639	58729	69931	66030	55075
x.	Deduct Staff welfare and Law and Order Costs	6338	6785	7234	8213	8933	9968	10664	12326	13187	13279	14040	14885
xi.	Deduct losses on commodities (not under SSO)										1801	2135	
xii.	Net Social Service Obligations (ix-x-xi)	14844	17188	21540	21878	23218	25934	32358	38314	45542	54851	49854	40190

Source:

1. Indian Railways Year Books from 2011-12 to 2022-23

Modal share of traffic - Road vs Rail

Year	Road Transport-Freight Movement (Numbers in Billion Tonnes Kilometres)	Road Transport-Freight Movement (Percentage of Total Freight Movement)	Railways-Freight Movement (Numbers in Billion Tonnes Kilometres)	Railways-Freight Movement (Percentage of Total Freight Movement)	Road Transport-Passenger Movement (Numbers in Billion Passenger Kilometres)	Road Transport-Passenger Movement (Percentage of Total Passenger Movement)	Railways-Passenger Movement (Numbers in Billion Passenger Kilometres)	Railways-Passenger Movement (Percentage of Total Passenger Movement)
1950-51	6.00	13.76	37.60	86.24	23.00	25.70	66.50	74.30
1960-61	14.00	16.22	72.30	83.78	80.90	51.01	77.70	48.99
1970-71	47.70	30.11	110.70	69.89	210.00	64.00	118.10	36.00
1980-81	90.90	38.10	147.70	61.90	541.80	72.20	208.60	27.80
1990-91	145.10	38.09	235.80	61.91	767.70	72.20	295.60	27.80
1999-2000	467.00	60.48	305.20	39.52	1831.60	80.96	430.70	19.04
2000-01	494.00	61.26	312.40	38.74	2075.50	81.95	457.00	18.05
2001-02	515.00	60.72	333.20	39.28	2413.10	83.10	490.90	16.90
2002-03	545.00	60.68	353.20	39.32	2814.70	84.53	515.00	15.47
2003-04	595.00	60.95	381.20	39.05	3070.20	85.01	541.20	14.99
2004-05	643.00	60.99	411.30	39.01	3469.30	85.77	575.70	14.23
2005-06	728.30	62.24	441.80	37.76	4251.70	87.35	615.60	12.65
2006-07	825.90	63.20	481.00	36.80	4657.00	87.02	694.80	12.98
2007-08	933.70	64.17	521.30	35.83	5482.00	87.68	770.00	12.32
2008-09	1021.60	64.95	551.40	35.05	6182.00	88.06	838.00	11.94
2009-10	1144.50	65.59	600.50	34.41	7192.00	88.84	903.40	11.16
2010-11	1287.30	67.29	625.70	32.71	8409.00	89.58	978.50	10.42
2011-12	1407.80	67.83	667.60	32.17	9478.00	90.06	1046.50	9.94
2012-13	1515.40	70.00	649.60	30.00	10461.00	90.50	1098.10	9.50

2013-14	1650.80	71.26	665.80	28.74	11730.00	91.14	1140.40	8.86
2014-15	1824.30	72.80	681.70	27.20	13403.00	92.12	1147.20	7.88
2015-16	2026.10	75.58	654.50	24.42	15415.00	93.10	1143.00	6.90
2016-17			620.2				1149.8	
2017-18			692.9				1177.7	
2018-19			738.5				1157.2	
2019-20			707.7				1050.7	
2020-21			719.8				231.1	
2021-22			871.8				590.2	
2022-23			959.6				958.9	

Source:

1. Indian Railways Year Books from 1970-71 to 2022-23
2. Indian Railways Annual Report and Accounts from 1970-71 to 2022-23
3. Annual Statistical Statements of Indian Railways from 1970-71 to 2022-23
4. Year book 2011-12 to 2022-23 of Ministry of Road Transport

Projects identified for execution under Vision-2024

Doubling: The following works have been planned:

- ❖ Completion of fifty-eight Super Critical projects of total route length of 3,750 Kilometre (balance route length 1471 Kilometre) at the total cost INR 36,700 crore, with throw forward of INR 8,100 crore by December 2021 and completion of remaining 2 projects by March 2022.
- ❖ Completion of sixty-eight Critical projects having total route length of 6,918 Kilometre (balance route length 6075 Kilometre), at the total cost of INR 69,900 crore, with throw forward of INR 45400 crore by March 2024.
- ❖ Completion of an additional twenty Coal projects with a total route length of 2350 Kilometre (balance route length 1508 Kilometre), at a total cost of INR 29,800 crore with a throw forward of INR 15000 crore by March 2024 (thirty-one Coal projects and ten Port connectivity projects are covered in Super Critical & Critical projects). These coal projects include seven new lines with a total length of 619 Kilometre (balance route length 377 Kilometre) costing INR 12903 crore (throw forward of INR 4639 crore) and 1 gauge conversion project of 285 Kilometre route length (balance route length 24 Kilometre) costing INR 2005 crore with throw forward of INR 288 crore.
- ❖ Completion of forty-eight projects on High-Density Network (HDN) and Highly Utilized Network (HUN) routes length of 3,700 Kilometre (balance route length 3444 Kilometre), costing INR 42,800 crore with throw forward of INR 34463 crore by March 2024.

New Line: Focus will be on completing National Projects as under:

- ❖ Completion of four National projects of the NE Region with a total length of 294 Kilometres (balance route length 282 Kilometres) costing INR 27,500 crore and throw forward INR 12094 crore by March 2023.
- ❖ Completion of Udampur-Srinagar-Baramulla Rail Link Project of 272 Kilometre route length (balance route length 111 Kilometre), costing INR. 28000 crore and throw forward INR 9949 crore by December 2022.
- ❖ Completion of two projects namely, Rishikesh-Karanprayag and Bhanupalli-Bilaspur projects with 188 Kilometre route length costing INR 23,000 crore throw forward of INR 20718 crore by March 2025.

Gauge Conversion: The following works are planned:

- ❖ Completion of thirty Gauge conversion projects with a total route length of 3913 Kilometre (balance route length 2,292 Kilometre) costing INR 31,200 crore and throw forward of INR 15053 crore in March 2024.

Traffic Facility: Following traffic facility works are planned:

- ❖ Completion of one hundred five Traffic facilities works costing INR 10150 crore with a throw-forward of INR. 6782 crores, by March 2024.
- ❖ One hundred forty-six Railway electrification projects, with a route length of 23800 kilometres and a throw forward of INR. 20209 crores, by December 2023.

Signalling & Telecommunication work

- ❖ Completion of Signalling & Telecommunication work including the provision of a Train Collision Avoidance System, Automatic Signalling, Long Term Evolution (LTE) & Centralised Traffic Control on High-Density Network & Freight Dense Highly Utilized Network routes, elimination of electro-mechanical signalling, replacement of overaged signalling gears, interlocking of Level Crossing gates & other miscellaneous works costing INR 21014 crore by Mar'2024.

Raising of sectional speed:

- ❖ Completion of works for raising of sectional speed to 160 kmph on New Delhi- Mumbai including Vadodara- Ahmedabad and New Delhi-Howrah including Kanpur- Lucknow routes costing INR 6804 crore and INR 6684 crore respectively by August 2023.
- ❖ Completion of infrastructural works for raising the sectional speed to 130 kmph on remaining Golden Quadrilateral and Diagonal routes by December 2021.

Elimination of Manned level crossings from the Golden Quadrilateral (GQ) and Golden Diagonal (GD) routes:

- ❖ Elimination of manned level crossings on Golden Quadrilateral and Golden Diagonal to enhance safety and operational speed, on priority.
- ❖ Completion of replacement of 1186 Level Crossings by Road over bridges, and 1223 by Road under bridges and diversion of twenty Level crossings a total cost of INR. 41200 crore, March 2025.

Different models of the Public Private Partnership projects

- 1. Service Contract:** In this model of Public-Private partnership, the private promoter performs a particular operation and maintenance function over a stipulated period for a defined/ agreed fee. The degree of privatization is very less in this model.
- 2. Rehabilitate, Operate, Maintain and Transfer:** Under this contractual arrangement, an existing facility is given to the private sector to revamp, operate and maintain for a specified concession period. The legal title is returned to the Government/ grantor after the contractual period.
- 3. Operation Management and Development Agreement:** Under this contractual agreement, the government owns the asset, and the private party is given its possession and responsibility to develop, finance, design, construct, improve, operate, and maintain the asset.
- 4. Input-based Distribution Franchisee Agreement:** Under this model, a public entity lease out the asset to a private party for operation and maintenance through a bidding process. The highest bidder who quotes the highest input rate for the specified activity is awarded the franchise.
- 5. Build Own and Operate:** This is a project delivery mechanism wherein a government entity grants the right to construct a project as per the pre-defined design and technical specifications; and operate the same, to a private-sector agency. The private party owns the project and operates it independently and is not required to transfer it back to the government entity at the end of the term, unlike BOOT or BOT models,
- 6. Management Contract:** In the Operation and Maintenance (O&M) and Management contracts (MC) models, the private Contractor is responsible for investment, operation, and maintenance functions, and has the authority to take operational decisions under a profit-sharing /fixed fee revenue sharing arrangement. The asset ownership typically vests in the public entity. The O&M agreements may have additional performance requirements viz investments for restoration or expansion of the facility etc. Such models has been implemented in the energy and water distribution sectors.
- 7. Build Lease and Transfer:** Under this model, the private developer is responsible for the construction and maintenance of the asset along with the operational activities comprising the support services. The Government assumes

the tenancy and is responsible for running the main operations during the lease term.

8. Build Own Lease Transfer: Under this PPP model a public entity grants a concession to a private party to build, own, and lease the facility to the agency, and after lease period, transfers the ownership of the facility to the client. In this arrangement the developer owns all the risks of project financing, construction, and responsibility of operation maintenance of the facility during the lease period.

10. Build Transfer and Lease: Under this model of PPP, the private party builds an asset, transfer it to the public entity. The public entity owns the assets and leases it to the private partner for providing the service and collect the user charges from the users of the facility /asset so developed.

11. Lease: Under this arrangement, public entity is accountable for investment and financing of the infrastructure assets and leased to private entity for a defined concession period. The private party assumes commercial risks during lease period. This is suitable in cases where assets have already been built.

12. Operate, Maintain Share and Transfer: Under this model, the operation and maintenance of the road is outsourced to a private entity for an agreed concession period. This model is analogous to the Build, Operate, and Transfer Toll model with construction, operation and maintenance.

13. Design Build and Operate: Under this PPP model, the public entity assigns a contract to the private party for the design, construction, operations, and management of assets for a period of time. The public entity finances the asset and retains ownership.

14. Design, Build, Operate and Transfer: In this PPP model, the public sector entity finances the construction of the assets and retains its ownership. The private partner designs, builds and operates the assets and provide agreed upon service outputs against an agreed operating fee during the stipulated operational period; and then transfers back the operations and maintenance to the public entity after agreed period.

14. Design, Build, Finance and Transfer: Under this model, a single contractor proficient in design, development, and finance is appointed for execution of the project work and eventually transfers ownership of asset to the public entity. It makes a single point of responsibility for delivering the project and in such cases although the public entity may provide partial funding or

benefits like tax exemptions/ concessions, the private party assumes most of the risks.

15. Design, Build, Own, Operate and Transfer: Under the Design, Build, Own, Operate and Transfer model, the private partner is assigned responsibility of design, construction and operations. The private entity owns the asset during the concession period and bears all the risks associated with construction, safety, and operation during that period. In return the public entity pays the private concessionaire the cost of construction, operation, and agreed margins.

Annuity Models

16. Build, Operate, Transfer - Annuity – Under this model, the public entity grants the project to the private entity and pays a fixed annuity on an annual or semi-annual basis towards compensation for the expenses of construction, operation, maintenance, and returns on works. The private entity assumes the associated risks of construction and operation during the project life cycle, whereas the public entity is responsible for land acquisition, concession approvals, etc.

17. Design, Build, Finance, Operate, Maintain and Transfer-Annuity: In this model, the public entity selects the private partner to grant concession through the competitive bidding process. The public entity pays the concessionaire agreed percentage of capital during the construction period and the concessionaire is responsible to raise the remaining funds for construction and operation and maintenance through debt and equity themselves. The public entity pays the concessionaire agreed annual/ semi -annual annuity payments towards recovery of the investment through. The private entity is fully responsible for the design, performance responsibility, and associated risks, quality of construction work, besides overseeing maintenance and safety of operational activities during the concession period. Under this annuity model equal risk sharing on both the entity, a free hand for designing and execution and choice of choosing IRR-based finance with MFIs, is provided for.

18. Design, Build, Finance, Operate and Transfer-Annuity: Under this model, the private entity takes up the responsibility of design, construction, and financing of the project along with the associated risks during the concession period. The concession period includes the construction as well as the operations period and is fixed from the appointed date. Therefore, in case of delay in commercial operation date, it reduces the operations period and consequently

adversely impacts the annuities received/ receivable towards recovery of the investment.

19. Design, Build, Operate and Transfer-Annuity: In this model, the public entity finances the project and the private entity builds the asset and is given the responsibility to operate and maintain the facility for a stipulated concession period. After the completion of the concession period, the asset is transferred back to the public entity. The public entity bears the financial risk, and the concessionaire bears the construction risks. This is used in case of low viability but highly strategic projects, viz green energy, rural electrification projects, etc.

20. Hybrid Annuity Model: This public-private partnership model is a combination of and engineering procurement and engineering and BOT-Annuity models. The public entity funds part of the construction cost, and the remaining fund is raised by the concessionaire through equity and/or loans. The concession period includes a fixed operational period for the concessionaire. The revenue collection goes to public entity and the concessionaire gets assured annuities linked to the performance and value of assets so created, towards recovery of investment. This model provides liquidity to the private developer, and the public entity shares the financial risk. The concessionaire bears the risks associated with construction and maintenance of asset.

Build, Operate and Transfer Models

22. Build, Operate and Transfer: This is a conventional public-private partnership model wherein the private entity is given responsibility for financing, building, and operating the asset and recover the investment made through revenues generated from operations during the concession period (normally 25-30 years). After the concession period, the project is transferred to the public authorities. Under this model, the private entity bears both the construction and financial risks and is used in case of projects having higher investments, high Internal rate of Returns, and longer gestation periods.

23. Build, Operate and Transfer-Toll and Annuity: This model is similar to the normal build-own and transfer model with the additional provision of Toll and Annuity towards recovery and revenues. The revenue risk is taken by the public entity and the concessionaire bears the risks of project execution, operations, safety, cash flows etc and in turn, is compensated by the public entity through annuity payments.

24. Build, Operate and Transfer-Toll: Under this toll-based build-operate-transfer model, the private developer is responsible for the construction of road infrastructure and is given permission to recover the investment made through the collection of toll tax during the concession period (normally 30 years). The concessionaire bears all the risks of project execution, operating and revenue generation from the project. After the completion of the concession period, the infrastructure asset is transferred to the public entity.

25. Build, Own, Operate and Manage: Under this model, the private entity is responsible to design, operate and manage the project in the stipulated timeframe. The private entity bears risks of project execution, repairs, and maintenance risk but has scope for innovation and a certain level of control over the process. The model is best suited for projects involving expertise in highly technical domain knowledge.

26. Build, Own, Operate, Share and Transfer: This model allows the private concessionaire to finance, construct, own, operate, and maintain the asset, share revenue and transfer the asset to public entity after completion of the concession period. The private entity recovers expenses accordingly.

27. Build, Own, Operate and Transfer: In this model, the private entity owns the projects during the concession period and operates the facility to recover the investment made and maintenance expenses besides profit margin on the costs. This model is being used in E-Governance projects viz, , Central Processing centres of Income-Tax, Passport Seva facility centres etc.

27. Design, Build, Finance and Operate: In this model, the private entity bears the risks associated with project execution, finances, operations and maintenance, safety and management of the facility. The private party earns income from the project to recover the investment made in a project during the concession period. The public entity may fund the project during the execution stage. The concessionaire operates the facility developed under the project for a fixed concession period and is transferred back to the public entity after completion of the concession period.

28. Design, Build, Finance, Operate and Transfer: Under this PPP model, the private concessionaire bears risks associated with construction, financing, operation, and safety, besides revenue risks during the concession period and transfers the project back to the public entity thereafter. The public entity is not

liable to pay any annuity or compensate for any loss. Normally low-cost and brownfield projects are taken up under this model.

29. Design, Build, Finance, Operate and Transfer-Toll: In this model, the concessionaire entering bears all the risks, of project execution, financing, operation, and safety besides revenue earnings through Toll taxes until the concession period after which the collection rights are transferred to the public entity. Since the revenues under this model are dependent on the traffic movement, the concessionaire bears recovery risk. This model is commonly used in highway development greenfield projects.

2017/AC-II/1/19/SPVs(Part)

I/3083227/2023

भारत सरकार Government of India
रेल मंत्रालय Ministry of Railways
रेलवे बोर्ड (Railway Board)

RBA No. 37/2023
GST Circular No. 14/2023

No. 2017/AC-II/1/19/SPVs(part)

New Delhi dated 30.11.2023

General Managers,
WR, SWR, SCR, ECoR, SECR & ECR

Sub:- Guidelines for issuing GST invoices for O&M charges against
SPVs and accounting of GST invoices from SPVs for User
charges.

Ref:- ED(Infra)-1's letter No 2017/Infra/18/2/dated 21.09.2023.

Railway Board vide above referred letter has advised to SPVs that in terms of ministry of Finance Office Memorandum dated 04.01.2023, it would transfer apportioned revenue to SPVs inclusive of GST starting from FY 2023-2024. There are two transactions involved.

a. O&M charges payable by SPVs to Railways.

b. User charges payable by Railways to SPVs.

2. As on date IR is required to raise Tax invoices on its customer under forward charge mechanism. Therefore, all O&M charges recoverable from SPVs on Forward charge Mechanism will attract GST @ 18% . Similarly, SPVs share of apportioned revenue would include an element of 18% GST as clarified by Board vide letter ibid.

Following accounting processes are indicated for immediate implementation.

a) SPV will raise GST compliant Invoice on IR in respect of Apportioned Revenue, which would include GST @ 18%. For example, if apportioned revenue payable to a SPV is Rs. 100/-, the concerned SPV shall raise GST Invoice on the concerned Railway for Rs. 84.75 plus GST @ 18% of Rs. 15.25. Concerned Zonal Railway shall account for this Invoice in IPAS and will use appropriate Input Tax Credit Flags 'T4' or 'C2' as the case may be.

I/3083227/2023

Accounting Entries shall be as follows:

Expenditure Head ---Dr. Rs. 84.75

Misc. Advance (GST) ---- Dr. Rs. 15.25 (T4 or C2-Flag)

Deposit Misc (SPV) ----- Cr.Rs. 100/-

b) Concerned Zonal Railway shall issue GST compliant Tax Invoice on the SPVs for O&M Charges. For example, if Rs. 10/- is recoverable from the SPVs, then IR shall issue GST Invoice with base value of Rs. 10/- plus GST @18% of Rs. 1.80 totaling to Rs. 11.80. Concerned Zonal Railway shall use the CRIS GST Manual utility system to generate Tax Invoice and report the same in the GST Returns.

Accounting Entries shall be as follows:--
Deposit misc. (SPV) ----- Dr. Rs. 11.80

Deposit Misc.(Outward GST Liability) --- Cr. Rs. 1.80

Relevant Expenditure Head ----- Cr. Rs. 10.00

c) Basis above, net payment is to be made to SPV which works out to Rs. 88.20-(Rs. 100 Apportioned Revenue- O&M charges of Rs. 11.80.

Accounting entries shall be as follows:-

Deposit misc.(SPV) --- Dr. Rs. 88.20 (by clearing Rs. 100('a' above) and Rs. 11.80 ('b' above).

Cheques and Bills ---- Cr. Rs. 88.20

d) Outward GST liability of Rs. 1.80 as illustrated at (b) above gets offset by Input Tax Credit as brought out at (a) above, while discharging the GST liability by the Principal Railways every month.

3.It is clarified that:

- a. Rate of GST on O&M charges is 18%
- b. Invoicing for O&M charges is to be done within 7 days of working out of Apportioned earnings for SPV.

I/3083227/2023

- c. Payment to SPVs may be made only after SPV issues GST compliant Tax Invoice and after adjusting the O&M charges to be recovered from SPVs.
- d. Other Taxes and duties recoveries by IR viz., TDS etc shall be complied with as per statutory requirement.

This issues with the approval of competent authority.

Signed by
Vipul Tripathi
Date: 30-11-2023 19:30:14
(Vipul Tripathi)
Director/Accounts
Railway Board
Email ID: vipul.tripathi@gov.in
Ph No: 8920027770

2020/TC(FM)/11/19-Part(1)

I/3052045/2022

भारत सरकार / GOVERNMENT OF INDIA
रेल मंत्रालय / MINISTRY OF RAILWAYS
(रेलवे बोर्ड / RAILWAY BOARD)

No. 2020/TC(FM)/11/19 (Part-1)

New Delhi, Date: ²⁶09.2022

The General Managers,
All Zonal Railways.

Sub: Operations of the 'Joint Parcel Product (JPP)' by Indian Railways and India Post -- reg. Proof of Concept.

Ref: Board's letter no. 2020/TC(FM)/11/19, dated 29.03.2022.

A pilot project was launched vide Board's letter under reference, for 'Joint Parcel Product (JPP)' of Indian Railways and India Post, by attaching a Parcel Van in train no. 19045/19046 (Tapti Ganga Exp.) between Surat and Varanasi. Under the 'JPP', wherein India Post is to provide 'first & last mile' services, and Indian Railways is to provide the 'middle mile' services.

Requests are being received from the India Post as well as from some Zonal Railways for extension of the 'Proof of Concept (PoC)' over other routes of Indian Railways. Hence, in order to expedite the approval process for such expansion, it has been decided that:

1. The proof of concept may be expanded -- by earmarking space only in the SLR of any scheduled passenger-carrying train -- by the Division where the train originates, in consultation with India Post and with the approval of the DRM.
2. It must be ensured that the right-time start and punctuality of the train is not adversely affected on this account.
3. Booking of consignments shall be done consignment-wise in Parcel Management System (PMS), by the staff of Department of Posts. For this purpose, Department of Posts may be defined as a City Booking Agency (CBA) in the PMS, at the concerned originating and destination station.
4. Charging for first-mile and/or last-mile services, to be provided by India Post, shall be decided by India Post.
5. Railway shall charge the 'JPP' services at a premium of 10% over the scale applicable for that particular train, during the Proof of Concept. (Charging for trains running at 'R'-scale shall be at R+10%, for trains running at 'P'-scale shall be at P+10%, and so on.)
6. Other relevant conditions, as mentioned in Railway Board's letter No. 2020/TC(FM)/11/19, dated 29.03.2022 (copy enclosed), shall remain applicable.

2020/TC(FM)/11/19-Part(1)

I/3052045/2022

These instructions shall remain valid for **six months** from the issue of this letter.

Action may be taken accordingly please under intimation to this office.

This issues in consultation with the Coaching and Finance directorates of Ministry of Railways.

DA: As above.


(Ashutosh Mishra)
Jt. Director Freight Marketing
Railway Board

RAIL POST-GATI SHAKTI CARGO EXPRESS SERVICE

User Name	ashish.pmscris		
User Mobile	8130797622		
Order ID:	I00ST2205001		
Pickup Location	ghjkl, PIN 395001 Nearest Railway Station ST		
Delivery Location	hgj, PIN 221005 Nearest Railway Station BSB		
Distance:	1378.00 Kms.		
Type of Service Required:	Both		
Type of Charges	Prices	GST Applied	Overall Charges with GST
Railway charges:	Rs.10560.00	Rs.528.00	Rs.11088.00
Postal charges:	Rs.11440.00	Rs.560.00	Rs.12012.00
Insurance charges:	Rs.7.50	Rs.1.35	Rs.9.00
Total charges:	Rs. 23109.00 /-		
Payment Method:	online		
Payment Gateway:	123		
Gateway ID:	I00ST2205001		
MR Number:	9000000328		
Railway Invoice Number:	PR24WR9000000328		
Postal Invoice Number:	IP24WR9000000328		
Payment Status:	Paid		
Payment Status Date:	22-05-2024 17:41:18		
Order Status:	Accepted		
Order Placed on	22-05-2024 17:37:03		
Service Date:	23-05-2024		

This is computer generated receipt

Questionnaire for Survey						
S.No.						
(i)	Demographic Details					
	Name					
	Organisation					
	Role in the organisation					
	Experience in PPP projects	Yes/ No				
	No. of years in field					
(ii)	Please indicate your level of agreement with the following questions	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1
1	How aligned do you perceive the clear objectives and interests of stakeholders to be in PPP projects within Indian Railways	5	4	3	2	1
2	To what extent do you believe that efficient project management and governance positively contribute to the success of PPP projects in Indian Railways?	5	4	3	2	1
3	How effective do you find the stakeholder engagement processes in PPP projects within Indian Railways?	5	4	3	2	1
4	To what extent do you believe that comprehensive agreement including exit/trade options positively contribute to the success of PPP projects in Indian Railways?	5	4	3	2	1
5	How satisfied are you with the periodic review mechanisms	5	4	3	2	1

	implemented in PPP projects within Indian Railways?					
6	How satisfied are you with the current mechanisms for risk allocation and sharing among stakeholders in PPP projects within Indian Railways?	5	4	3	2	1
7	To what extent do you agree that adequate financing mechanisms positively contribute to the success of PPP projects in Indian Railways?	5	4	3	2	1
8	How would you rate the effectiveness of surplus/deficit sharing mechanisms in ensuring the viability of PPP projects in Indian Railways?	5	4	3	2	1
9	Do you believe that stakeholder participation during financial crises is crucial for maintaining the success of PPP projects in Indian Railways?	5	4	3	2	1
10	How challenging do you find the economic feasibility analysis of railway infrastructure projects within the current PPP framework?	5	4	3	2	1
11	To what extent do you believe that a robust legal framework positively contributes to the success of PPP projects in Indian Railways?	5	4	3	2	1
12	How would you rate the transparency and independence of	5	4	3	2	1

	the regulatory body overseeing PPP projects in Indian Railways?					
13	Do you agree that an effective dispute resolution mechanism is essential for ensuring the success of PPP projects in Indian Railways?	5	4	3	2	1
14	How important do you think it is to have policy certainty for attracting private investment in railway infrastructure through PPP models?	5	4	3	2	1
15	How satisfied are you with the current level of compliance by state governments in supporting PPP initiatives in Indian Railways?	5	4	3	2	1
16	Do you think that having a separate law or acts specifically designed for railway PPP projects is necessary for their success?	5	4	3	2	1
17	How effectively do you think contracting is carried out to provide scope for private players to sustain their business in PPP projects within Indian Railways?	5	4	3	2	1

Questions for Group Discussions

1. IR has come up with PPP policy in 2012 for encouraging private participation in Rail infrastructure projects. But the private participation in rail infrastructure projects is very limited to the strategic partners only like ports/ collieries etc. In other sectors like power, road, telecommunication etc, private participation is substantial. What constraints as per you are responsible for lesser private participation in railway infrastructure projects?
2. Given your experience and observations, what do you believe are the critical success factors for sustainable PPP infrastructure projects on IR?
3. Who are the main stakeholders involved in IR's PPP infrastructure projects?
4. In your views, how do different stakeholders cooperate and interact in the PPP processes?
5. Can you describe any challenges or synergies amongst stakeholders in railway's PPP infrastructure projects?
6. What role/ benefits is expected from an independent regulator?
7. Do you think independent regulator will have impact on participation in IR's PPP infrastructure projects?
8. How would you describe the role of Government including MoR in the PPP processes for IR's infrastructure projects?
9. Have you observed any government policy changes or shifts that significantly impacted PPP projects, either positively or negatively?
10. In your opinion, are there areas in which regulatory interventions can be improved to better support the objectives of PPP infrastructure projects for IR?
11. What financial, operational, or environmental sustainability measures do you believe should be prioritized in an infrastructure PPP model for IR?
12. How can the PPP model ensure equitable benefits and incentives for all stakeholders, from the government to private entities to the general public?
13. What incentives do you believe would motivate private stakeholders to participate actively and invest in a long-term partnership with the IR, in infrastructure projects?
14. From the perspective of the government or public sector, what incentives or returns are expected from a sustainable infrastructure PPP with IR?

15. In your experience, what challenges might be encountered while implementing a sustainable PPP model for IR's infrastructure projects? How can these be mitigated?
16. Have you witnessed any best practices or successful models in other sectors or countries that can be adapted for the IR's context?

SANJEEV SHARMA**PERSONAL DETAILS**

1. Father's name : Late Sh. I.D. Sharma
2. Service : Indian Railway Accounts Service (IRAS)
3. Present post : CFA/ NCRTC, earlier worked as FA&CAO, Northern Railway & OSD/Accounts, Railway Board
4. Mobile : 9717647518, 9910487515
5. Email : sanjeev.sharma1@nic.in, railsanjeev@gmail.com

EDUCATIONAL QUALIFICATION

Exam	College/ University
B.Com. (Hons)	SGTB Khalsa College, Delhi University
MBA	Faculty of Management Studies, Delhi University
LL.B.	Faculty of Law, Delhi University
PH.D.	School of Business, University of Petroleum and Energy Studies, Dehradun (pursuing)

PROFESSIONAL TRAINING

- Diploma in Project Management and Life Cycle Costing conducted by American Railcar Industries, Missouri, USA (December 2015).
- Training program on Diesel Locomotive technology conducted by GEDLPL, Eeire, USA (December 2019).

KEY SKILLS/KEY AREAS OF EXPERTISE

- Government Accounting, Financial Management, Establishment Rules, Accounting and Costing Reforms initiative, PPP, ERP and Taxation matters in Railways.

PAPERS PUBLISHED

- Sharma, S., Kandpal, V., and Gonzalez, E.S. (2024): A Comprehensive Review of Indian Railways Freight Business: Strategies for Regaining the

Lost Ground and Future Prospects, Case Studies on Transport Policy
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- "The Looming Storm: Pension Liabilities and the Impending Financial Crisis in the Railway Sector" accepted for publication in the International Journal of Business Excellence with Dr Saurabh Tiwari and Dr. Vinay Kandpal.
- Dhingra, T and Sharma, S. (2022): Rail Infrastructure—Journey Since Indian Independence and Beyond, Springer's Book- Infrastructure Planning And Management in India, (https://link.springer.com/chapter/10.1007/978-981-16-8837-9_4)
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- Singhania, M. and Sharma, S. (2012): Financial turnaround of Indian Railways (A), Emerald Emerging Market Case Studies, Vol. 2 No. 8. <https://doi.org/10.1108/20450621211289485>
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