Organisational restructuring of Indian Railways

Mridul Dutta

1Affiliation not available

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Abstract

Strategic drift of Indian Railways is due to its stagnant track capacity, declining freight transport, project overrun, poor operating ratio, and, lack of autonomy. This paper proposes two constructs for IR to mitigate sectoral competition and augment investor credibility for the next decade. The first construct is a meta-competency framework to regain its core-competency out of its constituent skills. The second construct is the top-down approach by the Government in creating a radical unitary public sector organization amalgamating railways, highways and inland waterways under Surface Transport Ministry. Further, this paper is a guidance to create an ecosystem for foreign direct investment and corporate restructuring of select IR subsidiaries in the Ministry of Railways. Strategic architecture discourse is on prioritizing economic value over passenger business.

1. INTRODUCTION

The Ministry of Railways operates Indian Railways (IR) comprising of six business divisions structured through one organization. These business divisions are Freight Services, Passenger Railways, Parcel Carrier, Catering & Tourism Services, Parking-lot Operations, and Ancillary Services. IR is a vertically integrated travel, transport & logistic organization. It has production units for its rolling stocks1 Rolling Stock in a term used similar to liquid inventory in the rail transport industry. Its value of assets can be readily ascertained. Rolling stock refers to locomotives, engines, wagons, coaches, gears, wheels, axles, body fittings, Signal & Telecommunication equipment., maintenance sheds2 A locomotive in the railway sector is assigned to a designated operation & maintenance workshop. The workshop is responsible for its O&M and mechanical performance., and support functions.

| No. | Vertical | Constituent skills/Business Specialisation |
|-----|----------|------------------------------------------|
| 1 | Financing, Construction and Project Implementation | RITES Limited Engineering consultancy, specializing in transport infrastructure and project management |
| | | Indian Railway Construction Company Limited Engineering and construction specialized in transport infrastructure in challenging terrains and abroad. |
| | | Mumbai Railway Vikas Corporation Suburban rail improvement projects and meeting future traffic requirements. |
| | | Rail Vikas Nigam Limited To build engineering works required by Indian Railways. |
| | | Indian Railway Finance Corporation Project Finance and raising financial resources for expansion and running through capital markets and other debt instruments. |
| 2 | Land and Station Development | The Rail Land Development Authority. Development of unused railway land assets for commercial development through the PPP or selecting a suitable real estate developer. |
| | | Indian Railway Stations Development Corporation Special Purpose Vehicle to develop new stations and redevelop existing Indian railway stations. |
| 3 | Rail Infrastructure | Dedicated Freight Corridor Corporation of India Limited Planning & development, mobilization of financial resources, construction, maintenance, and operation of Dedicated Freight Corridors. |
| | | Pipavav Railway Corporation limited Upgradation of freight routes to Pipavav Port, operations, and commercial functions. |
| 4 | Passenger and Freight Train Operations | Konkan Railway Corporation Limited This 741 km line connects Maharashtra, Goa and Karnataka states in India |
| | | Container Corporation of India Managing network of inland container depots and Container Freight Stations throughout India. |
| 5 | Information & Communications Technology | Centre for Railway Information Systems Designs, develops, implements and maintains important information systems of IR. |

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Indian Railways (IR) is going through a decade long strategic drift of track network capacity and freight transport. The effects of liberalization from 1991 to 2000 had little impact on this public sector behemoth. Subsequently, the Union Government was in denial mode from 2004 to 2013 and pushed the challenges to the Railway Board. These imposed challenges were cross-subsidisation of travel revenue, project overrun, poor operating ratio, and loss of IR freight business share to roadways. With the loss of autonomy and increasing burden of recurring expenses (compared to its peers in BRICS and Germany), the distinctive advantage of de-facto transportation in India was lost in the last three decades. IR constituent skills were depot capacity and project management experience. Consequently, in the last decade, it lost its sectoral competency to roadways & inland waterways. Camouflaged under the proposed bullet-train high-speed passenger corridor from Ahmedabad to Mumbai (Prabhu, 2016), business is far from promising (Shrivastva & Ali, 2019). Though the government boosts IR’s favorable statistics in track network reach, passenger volume, and its legacy of 150 years, its efficiency in speed is around 55 kmph for passenger mail/express trains and 25 kmph in freight business (Planning Commission, 2013). From 2007-08 to October 2011, train accidents (Scheepmaker, Willeboordse, Hoogenraad, Luijt & Goverde, 2020) accounted for 1,019 commuter/passenger deaths. Mitigation strategy required a budget provision of Rs. One lakh crore (Kakodkar, Vedachalam, Dhande & Srivastava, 2012) for the period of 2012-17 for improving the infrastructure of communication, removal of level-crossings, and track modernization. The number of railway accidents reduced from 131 in 2012 to 104 in 2017 and 59 in 2018. The usage of a common rail track for passenger trains led to a poor average speed of 25-30 kmph for freight trains. This poor average freight train speed coupled with the limited operation of heavy-haul freight trains resulted in gross load capacity of 5,400 tones as compared to 20,000-37,000 tones capacity of its BRICS peers (Mishra, 2018). Comparatively, the employee productivity of IR with that of BRICS peers is skewed. In 2008, the employee productivity of IR was 0.9 million traffic unit (TU) versus 1.6 in China and 2.6 in Russia (Kumar & Lohia, 2012). The employee productivity of IR in passenger traffic is good but in the freight business, it is 1/3rd of China. The practice of cross-subsidization of passenger-fare losses to freight-business is highest (Mehrotra, 2012) for India among its BRICS peers. The average axle load of the IR wagon is around 22.82 tones (Kumar & Kumar, 2017). The dedicated freight corridors (DFC) are capable of handling 25 tones and scalable to 32.5 tones (Rizvi & Bharti, 2015). The axe load of existing heavy-haul railway lines in China is 25 tones and development is in progress to increase it to 30 tones (Shao, Li & Chen, 2019). In 2011-12, road transport share in India’s transport sector was 69% in freight traffic and it is expected to 55% cent in 2021-22 (NTDPCR, 2012). According to the Planning Commission (2013), IR used to contribute only 1% of GDP from surface transport in India. Likewise, in 2017-18 roadways contributed 3.06%, railways contributed 0.75% and inland waterways contributed 0.06% only in India’s gross GVA (Gross Value Added =Gross Domestic Product + Subsidies - Taxes. The transport sector contributed 4.77% of India’s GVA (Economic Survey, 2018). This is an alarming macro-economic situation because the road transport sector is always expensive in a long-distance function and critical to India’s vulnerability as a net importer of crude oil (Chakrabarti & Arora, 2016). Cumulative losses from the passenger segment in IR added up to INR 789 Billion from 2016 to 2018 (Goyal, 2018). Government’s failure to curb GHG emission associated with transportation value chain (Climate Watch, 2019) may fail India’s 2030 commitment at 2016 Paris Agreement (By 2030, India has committed to reduce GHG emission intensity of its GDP by 33-35% below 2005 levels, increase the share of non-fossil fuel sources power capacity to 40% and create an additional ‘carbon sink’ of 2.5 to 3 billion tons of CO2 through additional forest cover).

Table – 2

| Country-wise productivity of railways in passenger, freight and track capacity | Country-wise productivity of railways in passenger, freight and track capacity |
| --- | --- |
| Productivity parameter | India |
| Passenger Kilo meter (million)/employee | 0.66 |
IR employs approximately 1.3 million employees. It has two core engineering departments: *Construction* for project management and *Openline* for operations & maintenance. In 2017, IR started collaborating with foreign partners like Google Inc., General Electric and Alstom SA. Through its subsidiary RailTel, IR is providing wireless internet access in about 230 major railway stations. IR made an exception in sourcing diesel locomotives in 2017 when the Government opened the FDI route for GE and Alstom for diesel locomotives, turnkey solutions, and electric trains (Economic Times, 2017). At an operational level, IR is establishing integrated semi high-speed corridors between major industrial hubs in the Delhi-Mumbai and Delhi-Kolkata routes. Freight loading by IR (excluding Konkan Railways) was 11,596 lakh tonnes and 12,215 lakh tonnes for the fiscal 2017-18 and 2018-19 respectively (Economic Survey, 2019). Revenue guidance forecast for the fiscal year 2017-18 was Indian National Rupees (INR) 1.874 trillion (US$28 billion). Freight and passenger revenue was INR 1.175 trillion (US$18 billion) and INR 501.25 billion (US$7.5 billion) respectively (Union Budget, 2019).

### 2. THEORY AND HYPOTHESES

Strategic flux (Harris, Dopson & Fitzpatrick, 2009; Andersson & Jansson, 2012; Zafirova, 2014) of IR started with the budget provision of INR 4000 crore in the fiscal year 1998-99 (Srivastava, Rao, Chakraborty & Rangamannar, 2003). In 2017-18, IR went ahead with an aggressive operating ratio\(^1\) Operating ratio is the ratio of expenditure to revenue. The target of 96.0% and subsequently it rationalized the target to 92.8% in 2018-19 (Ministry of Railways, 2017). But according to Comptroller and Auditor General of India (2019), IR operating ratio for fiscal 2017-18 was dismal 98.44%. The merger of Rail Budget with Union Budget for efficient management of public expenditure was an outcome of the second Administrative Reforms Commission (Joshi et al., 2016). Consequent to the merger with Union Budget, IR will continue to get budgetary support for capital expenditure, visualization of optimum rolling stocks (Borndörfer, Grimm, Reuther & Schlechte, 2019) and new projects, though it will have limited dividend liability from the accounting year 2018-19.

### Table 3

| Sl. No. | Operating Efficiency across Zonal Railway Divisions | Operating Efficiency across Zonal Railway Divisions |
|---------|--------------------------------------------------|--------------------------------------------------|
|         | Zonal Railway Division |                                                   |
| 1       | Central Railways          |                                                   |
| 2       | Eastern Railways          |                                                   |
| 3       | East Central Railway      |                                                   |
| 4       | East Coast Railway        |                                                   |
| 5       | Northern Railway          |                                                   |
| 6       | North Central Railway     |                                                   |
| 7       | North Eastern Railway     |                                                   |
| 8       | Northeast Frontier Railway|                                                   |
| 9       | North Western Railway     |                                                   |
| 10      | Southern Railway          |                                                   |
| 11      | South Central Railway     |                                                   |
| 12      | South Eastern Railway     |                                                   |
| 13      | South East Central Railway|                                                   |
| 14      | South Western Railway     |                                                   |
| 15      | Western Railway           |                                                   |
| 16      | West Central Railway      |                                                   |
| 17      | Metro Railway-Kolkata     |                                                   |
2.1 Project overrun and network expansion

From 1947 to 2011, IR could augment only 11,864 kilometers of rail track network. According to the Planning Commission (2013), IR network track capacity is incompatible with the expected requirements of the economic growth of India. Between 2004 and 2014, the Railway Ministry initiated 99 major projects without confirmed allocation of funds. In this period of 2004 to 2015, only one project got completed, whereas the remaining projects were stalled due to the pending capital demand of INR 5 trillion (Ministry of Railways, 2014). Till 2014, four of these pending projects suffered overrun of 30 years. Most of these expansion projects of the IR network faced challenges due to the high cost of right-of-way and environmental clearances (Sharma, 2017). The National Green Tribunal was established in 2010 empowered by an Act of the Parliament of India to handle the disposal of the cases pertaining to environmental issues in India. insisted that all urban and metro railway projects need an environmental impact assessment (PTI, 2016). According to the Railway Board yearbook, IR track capacity was 1,23,542 Km in 2018-19.

2.2 Competing transport segments

The Inland Waterways Authority of India (IWAI) was set up in 1986 with little guidance. IWAI policy was vague because there was little thrust for the inland waterways sector (Chawla, 2016). Later, in the 12th Five-year plan (2012-2017), the inland waterway segment was allocated INR 10,500 crore, incentives with tax exemption and 100% grant for waterway infrastructure development in North-Eastern India (Kurup, 2012). Subsequently, in the 13th Five-year plan, strategy implementation for IWAI was US$ 10 billion projection in inland waterway infrastructure. This was a boost for industry participants in core areas of maintenance, operations, and harboring (Global Market Insights, 2018). For policymakers, the benefits in inland waterway transportation are its economic efficiency (Biswas, 1987), lower capital cost, uncontested right-of-way, fuel efficiency, reduced maintenance cost, less of air pollution to city, and, lesser congestion (compared to road traffic, rail traffic, unmanned crossings, and manual crossing gates) are its additional benefits (Gupta, Anand & Bansal. 2017).

2.3 Losing customer segment

Deteriorating cabin services and unreliable schedules (Vanniarajan & Stephen, 2008) was an activation point for travelers to switch to low-cost airline operators. The ratio of average-railway-passenger-fares per passenger-kilometer (pkm) to average-freight-tariffs per net-ton-kilometer (ntkm) was 0.3 for India, 0.5 for Bangladesh and 1.2 for China (Nag, 2013). Thus, the customers from IR’s freight segment continued switching to its competing sectors in the transport industry. Other factors for switching were biased transport subsidy policy, improved inland waterways infrastructure, efficient cross-docking, improved road infrastructure, and last-mile delivery in secondary distribution. The burden of higher freight tariffs is detrimental to economic growth. India’s transport intensity11Transport intensity is share of transport services in the total production costs. India’s transport intensity is higher than 11% in South Africa, 14% in China, and 38% in Brazil. is highest among BRICS countries making less efficient for manufacturing and export sector (Chadha, Paul & Tandon, 2012). It raises commodity costs and reduces operating profit across the supply chain. Though IR has a competitive edge in transporting iron ore and mineral ore over short distances (100 km), this competitive advantage in distribution strategy for finished steel and manufacturing industry has a feasibility dependency of depot distance of 750 km from the factory gate/plant. Another condition is the last mile connectivity access from the depot. Thus, the high cost of transportation and inefficient secondary distribution leads to sectoral substitution of two verticals important for transportation & logistics. These switching verticals are metal & mineral industry and engineering/capital good industry. The government came to rescue for IR with the elimination of dual-tariff-policy for iron ore (PTI, 2016) though it was poorly commercialized to revive its declining freight business. Till 2008, the rate for transportation tariff of raw
materials for cement and iron ore to the ports meant for exports was charged three times higher for the same commodity meant for domestic consumption in steel and cement industries (Crisil, 2017). In this Dual Freight Rate policy of iron ore transportation for export traffic is charged a distance-based charge over and above the regular freight charges. It used to be billed per tonne from Rs 1125/- to Rs 300/- (Bandyopadhyay, Baruah & Gupta, 2016). In the metal, mineral, and ore extraction regions of India, IR lost revenue due to short-sighted railway divisions and unscrupulous manipulation of interchanging the classification of mineral ore and metal commodities. The good which was to be billed for export with higher tariff was manipulated as “meant for domestic consumption” with a lower tariff.

2.4 Accounting practices and cover-up of losses

Till 2016, IR used to practice the cash basis of accounting for revenue recognition. Cash basis accounting was considered a good practice of internal control over financial reporting structure (Tysiac, 2017) in a bureaucratic organisation with a paper-based manual accounting system. However, from the fiscal year 2017-18, in a significant accounting policy intervention, IR switched to the accrual basis of accounting from the cash basis of accounting (Manasi, 2016; Krishnan, 2014). Accrual-basis of accounting (Jensen, 2016) is the global benchmark for public sector accounting which enables the government to factor long term significant liabilities, such as employee pension, loans, assets, plant & machinery, and investments leading to a comprehensive statement of government’s financial position. Change management of adoption and implementation of the accrual-basis standards itself is a challenge (Salecha, 2018). These initiatives require extensive stakeholder support, skilled public sector accountants, supported by robust IT infrastructure and handholding by a professional accountancy organization (Gupta & Gupta, 2018) To sustain accounting reforms, IR will also need to align accrual-based accounting with performance costing and outcome budgeting system (Choudhary, 2019) The IR policy of using its freight business to camouflage losses from passenger business is evident with the practice of charging a premium from freight customers (Debroy & Desai, 2018).

2.5 Policy failure

Input cost on diesel fuel has been rising since 2001. This has a detrimental effect on the Government’s import of crude oil. At exchequer’s strategic control, little could be done with the fleet of 6,049 diesel locomotives consuming approximately 300 crore liters of fuel every fiscal. Successive Union governments continued to give subsidy on diesel till the year 2010 and subsequently were burdened with economic objectives. In 2012, the Government subsidy was INR 6.08 per liter of diesel. The successive Governments undermined economic principles and their political motives resulted in a situation where diesel fuel accounted for 40% of the government’s subsidy bill (Planning Commission, 2013; First Post Editors, 2014). Diesel subsidy accounting became more difficult when cross-subsidized fare schemes (Pimpalkhare & Rawal, 2018, Kumar, Gupta & Mehra, 2018) were introduced based on principles of the political sensitivity of elections rather than strategic initiatives. Freight price was increased, undermining the principles of elasticity, making IR scapegoat to the fluctuating market situations (Goyal, 2014).

3. RATIONAL AND RESEARCH GAP

The meta-competency (Srivastava, 2005) of a public sector organisation erodes when the focus is on distinct SBU rather than on constituent skills of its core competencies. There is sufficient research available on IR on its SBU approach, but little discourse on the core competencies of Zonal Railways (ZR). Because of the social obligation of IR, there is little discussion available on approaches to nurture, exploit, or prune business divisions of IR. Numerous pieces of literatures are available on the strategic framework for IR, but few of them address any role it plays in the supply chain efficiency critical to its client/industry verticals. Most of the strategy studies are confined within the jurisdiction of the Ministry of Railways. Little research is available on the integration of IR freight/passenger business with substituting transportation sectors of roadways, inland water, and pipelines. This paper attempts to address the literature gap in interconnecting the hierarchy of constituent skills on roadways, inland waterways, and IR depot capacity in India. Further, there is a generic gap in the strategic architecture of a unitary surface transport ministry in India. This study is critical because of the strategy implementation with a budget hike of 500% in the 12th Five-year plan (2012-17) was a flawed policy. Investment proposed by IR in the 2012-17 plan is INR 7.35 lakh crore as compared with INR 1.92 lakh crores in 2007-2012 in the 11th Five-year plan (Banerjee, 2011). For fiscal
2019-20, IR overall capital expenditure allocation was Rs.1,58,658 crores. Accountability of the failure of public enterprise(s) is a major issue worldwide (Beeri, 2006). Even after the merging of Rail Budget into Union Budget, the dilemma for the Government of India is to create capacity in transport infrastructure. The change management and the proposed avenues for investment should have been focused on dedicated freight corridors, real-estate, parking-lot services, facilitation centers (agricultural produce), rolling stocks, heavy haul track, land monetization, and, corporate restructuring.

Table – 4

| Sl. No. | Category       | Units  |
|---------|----------------|--------|
| 1       | Wagons         | 2,77,987 |
| 2       | Diesel Locomotives | 6,023 |
| 3       | Electric Locomotives | 5,399 |

Source: Railway Board, 2017

The questions framed in this concept paper are a set of an interdisciplinary study of organization development in IR. These assumptions will provide guidance to the travel and logistics industry as well. The following assumptions will provide guidance to the Government of India and Railway Ministry for 14th Five Year planning:

- **Hypothesis 1**. IR is witnessing strategic drift due to its poor control of revenue receipts and profit objectives.
- **Hypothesis 2**. IR has lost its distinctive competency to the road sector in India.
- **Hypothesis 3**. IR must delegate the management of commercial exploitation of its land rights and ancillary services to Zonal Divisions.

The Zonal Divisions of IR operate through a bureaucratic hierarchy. There is a lack of ownership in the cost-center approach in balancing the employee benefits, service standards, and social obligation such as hospitals/schools. This paper does not discuss these social aspects of IR in this strategy discourse.

4. OBJECTIVES OF THIS STUDY

After the literature review and scanning of the IR environment, the primary motivation of this concept paper is to prepare a literature gap on strategic architecture in the forthcoming 14th Five Year Plan (2022-27). Through a detailed historical analysis of IR, a theoretical diagnosis report on its failure to retain competitive advantage is proposed for review by practitioners and scholars. Thus, this paper provides comprehensive literature on the competencies of the railway sector in BRICS countries. Second, the strategic architecture advocates discarding the constituent skills that do not result in a competitive advantage of IR. This paper guides in conditioning the meta-competency of IR through developing and pruning of its constituent skills. This objective critically examines a set of turnaround management strategies (Boyne, 2006; Beeri, 2012) that will answer the planning and controls required for capacity augmentation of rolling stocks vis-à-vis revenue projection for the 14th Five Year plan. Because of the merging of Rail Budget with Union Budget, this strategy architecture is critical, because IR will continue to get budgetary support until 2027. After converting to a public sector organization in 2018-19, IR does not bear dividend liability. But with a cost-center budgetary allocation of Rs. 65,837 crores to IR in 2018-19 (Goyal, 2018), a lack of strategy architecture will leave the Government accountable for the next decade. The 13th Five Year Plan and the 14th Five Year Plan will be blamed for failing to steer distinctive competitive advantage of IR in surface transport.

Table – 5

| Sector-wise projects appraised by Niti Ayog in 2019 | Sector-wise projects appraised by Niti Ayog in 2019 |
|---------------------------------------------------|---------------------------------------------------|
| **Sector**                                       | **Number of Projects**                            |
| Shipping                                         | 01                                                 |
The second objective is to prepare a construct on the Surface Transport Policy in India. This policy may let IR refrain from social obligation and prune the cross-subsidisation of the passenger business. This paper discusses critical success factors for intermodal transportation in a network mix of relay/hub-and-spoke format. As an intermodal surface transport industry, this construct proposes the Government to merge the Railway Ministry, the Ministry of Road Transport & Highways, and the Ministry of Water Resources into unitary Ministry of Surface Transport under the jurisdiction of a strong Surface Transport Ministry. We propose this in anticipation of the required critical thrust for India’s economic growth of 7.4% to 7.9% per annum for the 14th Five-year plan starting from the year 2022. The strategic discourse is guidance in creating an ecosystem for FDI, PPP, and corporate restructuring of subsidiaries/SBUs of the Ministry of Railways.

4. METHOD

The paper is a comparison of literature available on IR in change management, organizational development, and deregulation of capital expenditure, intermodal supply chain management initiatives, and diversification into international projects, real estate, and technology-based solutions. Analysis and interpretation are conducted through journals, reports, news-editorial, and proceedings in the Parliament of India aggregated through the systematic review (Tranfield, Denyer & Smart, 2003) on domains of surface transportation, public enterprise, strategic drift, BRICS economies, environmental norms, and, intermodal connectivity. This paper is limited to government and travel, transport & logistics vertical only.

Table – 6

| Research domain                      | Methodology for literature review | Methodology for literature review | Methodology for literature review | Methodology for literature review |
|--------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Travel, Transport and Logistics      | Railways Roadways Inland Waterways Port superstructures Containerization | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Open/Abstract                     |
| Environmental norms                 | Fuel subsidy Paris Convention Right-of-way National Green Tribunal GHG emissions | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Open/Abstract                     |
| Public sector enterprise             | India Accounting standards Organizational Development Land monetization | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Open/Abstract                     |
| Intermodal connectivity              | Bangladesh, China,North East India Port & waterways Secondary distribution Cold supply chain | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Journals, books, book chapter, conference proceedings, blogs, news articles, and working papers. | Open/Abstract                     |
Peer-reviewed literature from online databases of SSRN, Elsevier, ResearchGate, and ScienceDirect are used. Snowball sampling (Allen, 2017) and manual screening (Miwa, Thomas, O’Mara-Eves & Ananiadou, 2014) of literature were conducted with personal discretion with due relevance to this paper. To keep the literature aligned to railways, infrastructure, and BRICS economies, articles that focused on infrastructure capacity of Brazil, China, Russia, the USA as well as Germany were thoroughly reviewed.

5. DISCUSSION

The integration of administration and control between various surface transport departments of the Government is an issue for strategic control. For the holistic contribution of the transport sector in India’s economic growth, this paper advocate for mobilizing organizational restructuring (Gangwar & Raghuram, 2017) of all the government aided surface transport sectors and their SBUs. The SBUs are National Highways Development Programme (NHDP) (1998) had an objective of developing roads of international standards, enhance road transport capacity, enhanced safety features, grade separator, etc. The program was implemented by National Highways Authority of India, under the Ministry of Road, Transport, and Highways. Seven important phases are Golden Quadrilateral network, North-South and East-West corridor, the four-lane project of high-density national highways, up-gradation of 20,000 km of single-lane roads to two-lane standards with paved shoulders, Six-lane project of 6,500 km of existing four-lane highways, construction of 1,000 km of expressways, and construction of ring roads, by-passes, flyovers, etc., Dedicated Freight Corridor Corporation of India (DFCCIL) (2006) is a corporation run by the Ministry of Railways to undertake end to end management of the Dedicated Freight Corridors. Two DFC under implementation is Western DFC (1,468 km) from Uttar Pradesh to Jawaharlal Nehru Port in Mumbai, Maharashtra, and Eastern DFC (1,760 km) from Punjab to West Bengal. The other proposed DFC are: East-West (2,000 km) Kolkata to Mumbai; North-South (2,173 km) from Delhi to Chennai; East Coast (1,100 km) from Kharagpur to Vijayawada; and South-West (890 km) from Chennai to Goa through Bangalore-Chennai Industrial Corridor, high-speed passenger train (Indian Railways do not operate High-Speed Trains capable of traveling at 200 km/h. In 2015, the Union Government approved the US $15 billion project proposal of Japan to build a high-speed railway of a maximum speed of 320 kmph between Mumbai and Ahmedabad. The project is expected to be completed by 2022 and operationalise in 2023. Under ideal conditions, this HST will take 180 minutes between Ahmedabad and Mumbai at a cheaper cost than air travel, and Inland Waterways Authority of India (Ministry of Shipping mobilized National Waterways Act, 2016 enabled 111 National Waterways for inland water transport. The NW network covers around 20,275.5 km. & Sagarmala project) (Maritime transport in India is serviced by 12 major ports, 200 notified minor and intermediate ports in the coasts of states and Union Territories. In 2015, the Ministry of Shipping proposed a strategic and customer-oriented US$120 billion program called Sagarmala. Sagarmala comprises of setting up of new ports, modernization of existing ports, development of 14 Coastal Economic Zones and Coastal Economic Units, linking road-rail connectivity, multi-modal logistics systems, pipelines, inland waterways, and coastal community development. As a public exchequer, the government needs to create a tradeoff between speed (kmph) and life-cycle energy costs (Manzo & Salling, 2016) for each mode of the transport sector. The merging of Rail Budget with Union Budget (Gohain, 2016) will be a critical activation point in the history of the infrastructure sector of India. This activation point should provide threshold momentum to facilitate intermodal, multi-modal, and interoperable transport capacity of IR with these surface transport SBUs.

The road transport sector is a clear choice of the economy with its share of 3.06% in India’s GVA for 2017-18, as compared to the IR contribution of meager 0.75% (Economic Survey, 2018). The dependency of road transport in India’s economy is not sustainable because of the very high amount of GHG (160 gram per tonne-kilometer) emissions are expressed in g per tonne-kilometer abbreviated as g/tkm. It is a unit of measure of grams of CO2 emission for the transport of one metric ton (1000 Kg) of goods by transport mode of road, rail, air, sea, inland waterways, pipeline over a distance of one kilometer.) emissions from road freight transport compared with 29 g/tkm for rail freight and 31 g/tkm for shipping transport (Planning Commission, 2013; Kumar, 2018). As of 2006, the share of Inland Waterways in India’s total cargo capacity
was lowest at 0.4% in comparison to 5.6% of the EU, 8.7% of China, and 8.3% of the USA. The government and the policymakers need to make their strategic choice of transport mix aligned with the environmental commitment of the 2016 Paris Agreement of the United Nations Framework Convention on Climate Change (Kumar & Naik, 2019). IR has little learned on the conventional life-cycle analysis (Facanha & Horvath, 2006; Kalluri et al., 2016) practices to evaluate and invest its strategic transport mix. This transport mix is based on the overall environmental impacts, GHG emissions (Scheepmaker, Pudney, Albrecht, Goverde & Howlett, 2020), project overrun in infrastructure projects, as well as maintenance of inter-modal transport capacity. To mitigate the environmental impact (Merchan, Belboom & Léonard, 2015) of infrastructure capacity expansion, IR needs to qualify the perennial challenges and contributing activities throughout the project-life cycle. An acceptable and moderated benchmark on GHG emission cost, environmental impact needs to be modeled for IR in comparison to its peers in China, Europe, USA, and Russia. This strategic niche management will pave the learning path for the policymakers with its preferred project alternatives in developing new multi-modal infrastructure for surface transportation. IR strategy architecture is discussed below.

1. Ease of doing business and transparency: Investment in different logistic functions in varying degrees needs to be streamlined in the IR through private sector participation, corporate collaboration, and ease of doing business. The share of private infrastructure investments in the economy was 50-60 percent for the 12th Five-year plan (2012-17). To meet the ambition of 100% FDI in high-speed train projects such as Beijing-Shanghai high-speed railway (Yan, Li & Han, 2019), dedicated freight corridors, rolling stock, electrification, signaling systems, freight terminals, passenger terminals, infrastructure in industrial parks and, mass rapid transport systems (MRTS), IR will require significant organizational restructuring supported by top-down change management approach. The investment will be critical in public-private partnership models (Cheng, Wang & Xiong, 2020) in railways as well as in containerization. Automated container terminals and transportation systems (Günther & Kim, 2005) will be a standard operating procedure in India for the next 20 years. To develop IR containerization as best practice in inbound international logistics, it will require expansion in container traffic with intermodal77Intermodal is a cargo practice where all areas of the transport chain are integrated such that inland vessels, ships, port terminals, trucks, and trains are adapted to handle the same set of containers with standards of ISO 28000:2007 or security management of supply chain. connectivity (Rodrigue, Comtois & Slack, 2017) supported by a network of dry ports. Transportation interoperability will be SOP in the 14,500 km route through inland waterways & coastal shipping, hub-and-spoke distribution network (Haralambides, 2019), relay (Ali, Radhakrishnan, Pulat & Gaddipati, 2002) and the last-mile delivery through road transport from IR depots/warehouses. Facilitating ease of doing business by generalizing the operational specifications of coastal ships and vessels is a welcome step from the Government.

After reviewing the strategic initiatives of China and Russia at the beginning of the millennium, it is seen that IR was nowhere in the transformation. Having missed its opportunity to transform 20 years ago, IR has limited options to react to strategic choices except for the capacity expansion. Integrated supply chain (George & Rangaraj, 2008) is a mantra for IR’s clients and its prospective verticals for reducing logistics cost in inbound and outbound transportation (Raghuram & Gangwar, 2007). It has a leadership role in working seamlessly with actors in logistic solutions for the last-mile delivery and in cutting down the holding cost for cement, dairy, perishable food, and cold supply chain. Reducing time to reach the consumption points and inbound supply chain sources are critical for cement, dairy, short shelf-life, and cold supply chain products (Kumar, Chibuzo, Garza-Reyes, Kumari, Rocha-Lona & Lopez-Torres, 2017). The proposed investment of INR 2000 crores for hinterland connectivity will boost the multi-modal logistics objective of the pro-industry government at the heart of its mission Make-in-India program88Make in India is a localised manufacturing & export-oriented initiative of National Democratic Alliance led Government mission launched in 2014. To implement this mission, 100% Foreign Direct Investment was permitted in 23 sectors. However, how good or worse India’s political leadership in creating an environment conducive for PPP and FDI in the transport infrastructure is indicated with a volume of private investments and PPP revenue models. With an objective to sustain a 60%-70% contribution from PPP model in the 13th Five-year plan (2017-22), transparency
in transport reforms, cross-subsidising of passenger tariff, fiscal discipline, and a tough call for pruning unsustainable railways freight tariffs is already in practice, though investment ecosystem is not in sync with port superstructures (Kavirathna, Kawasaki, Hanaoka & Matsuda, 2008) in India.

2. Deregulation of capital expenditure investment in 13th Five-Year plan: The capital investment targeting rolling stocks has to be regulated by a corporation or an authority incorporated by the Government. Since, both the ministerial and commercial powers are vested with the Railway Board, separation of the regulatory & policy roles from the commercial activity will be an essential decision for private sector participation and organizational control (Raghuram, 2002). To mitigate the conflict of interest, the exclusivity of the Directors to Railway Board is to be reserved without any political nomination or recommendation. On accounting practices, the accrual basis of accounting for revenue recognition is a short-term smoke screen. Contrarily, cash-based revenue recognition compliance improves internal control over financial reporting structure (Tysiac, 2017), but there could be perceived conflict of interests (Nwogugu, 2011), political mileage (Mitchell, 2011), and, the vested interest of econo-political mileage (Sriraman, 2000). Focus on urban projects on MRTS in metro cities and A & B tier-cities will invite private participation for franchised intercity train services (Stead, Wheat, Smith & Ojeda-Cabrál, 2019). The risk of latent demand and mispriced congestion (Arnott & Small, 1994) in sub-urban or diesel-electric multiple unit (DEMU) trains may need surgical intervention by city planners and reengineering of passenger interaction process to enhance commuter’s satisfaction in safety, security, and comfortability (Kadam & Bandyopadhyay, 2019). Urban road traffic congestion control is proven practice through increasing the capacity of MRTS such as the urban metro railroad. The switching of personal road transport to MRTS may not realize immediate revenue and usage volume due to the commuter’s motivation to restrict change, rush hour time, and cost per trip. However, the policy of deregulating the price of High-Speed-Diesel and Petrol fuels, the short term subsidy offered in the MRTS investment and high cost of right-of-way will make it unsuitable in terms of the cost borne by urban planning initiatives under the Jawaharlal Nehru National Urban Renewal Mission (Chatterjee, 2013).

3. Supply Chain Management capacity of IR: Development of North Eastern India is crucial for trade with ASEAN and Far East Countries. The Mekong Ganga Cooperation and the 1360 km Trilateral Highway Moreh (India) to Maw Sot (Thailand), through Bagan (Myanmar), is one of the strategies. The feeder route Diphu-Karong-Imphal-Moreh, the port at Dawei, Myanmar, and optical fiber link of Moreh-Mandalay are a groundbreaking investment, essential (Bhattacharyya & Chakraborty, 2010) to this intermodal capacity. However, this intermodal capacity may not be commercially viable for Northeast Frontier Railways due to factors like low volume of international trade and challenging geographical terrain. Northeast Frontier Railways may optimize heavy haul99Heavy haul railways should either be capable of 8000 tones and above with axle load up to 27 tones and above or freight volume is more than 40 Metric tons on distance longer than 150km. corridor (Nag, 2013) considering the demand patterns, fleet size, and terminal facilities. It is a high time for IR to take a call to stop or stall the uneconomic freight routes of Northeast Frontier Railways (Dutta, 2018). Instead, as a strategic niche initiative, Northeast Frontier Railways must start the logistic mix of intermodal connectivity and infrastructure investment through venturing into inland water transport connectivity. This strategy will aim to a seamless policy of maritime/land interface with Bangladesh (Notteboom & Rodrigue, 2008). For the optimization of warehousing facilities in the manufacturing clusters, a strategic mix of intermodal transportation, port regionalization, and maritime/land interface is needed. As a best practice in Brazil, Russia, China, and North America, port regionalization is serving to optimize route capacity by reducing congestion and provide dynamic access to the hinterland with rail freight. Similarly, the intermodal-transport capacity of North Eastern India with Myanmar, Bangladesh, and Thailand will serve long-distance trade corridors of ASEAN and Far East markets. Intermodal transport will not only provide access to the manufacturing clusters in the hinterland but leverage the port capacity to support the export logistic function of landlocked North-Eastern India. The constraint in this strategy implementation is the longer distance due to geographical terrain, and exclusivity of transportation networks that have developed in the last two hundred years. One of the IR cold supply chain innovation
is its milk tankers. IR has made transportation of milk possible by maintaining temperature control
of 04 degrees Celsius. These specialized milk containers/wagons are attached to express trains that
perform intercity (1-2 hours of distance) travel at a maximum speed of 110km/h. This know-how is a
significant opportunity for IR because road transport de-facto controls the end-to-end cold supply chain
in India. India has around 40,000 refrigerated trucks engaged in cold SCM operating from factory gate
to stockless depots. These trucks require constant energy for refrigeration. They cannot match the
long-distance hauls of IR. This capacity gap in cold SCM needs immediate attention to tap freight
business opportunities arising from fresh organics vegetable produce, flowers, freshwater fish, poultry,
and perishable beverages. IR needs to invest in skilled human resource capacity (Bag, 2016) for cold
SCM and mitigate constraints of non-recyclable packaging, reverse logistics, cold storage infrastructure,
and technology obsolescence. In the future, green logistics may open up an opportunity for India's
commitment to the environment. To support with investment ecosystem, the Government needs to
open 100% FDI in B2C in groceries and cold SCM. India's share in fresh farm export is only 1% in
the world (Miller, 2016). This is a gross mismatch of strategy outlay because the farm & horticulture
sector of India has forever increased the production of fruits & vegetables. Though India is a vast
dairy country, about 40% of its milk production goes through distressed sales due to inadequate cold
SCM infrastructure. Mixed-integer linear programming (Toul, Echhatbi & Charkaouni, 2016), multi-
objective vehicle routing solution (Gallo, Accorsi, Baruffaldi & Manzini, 2017) is to be augmented in the
existing cold chain network configuration (Raut, Gardas, Narwane & Narkhede, 2019). The integrated
components of this cold supply chain are the farmers, orchards, processing centers, secondary packaging
units, distributors, storage, or consolidation nodes where these products are conserved, stored, and
consolidated for primary distribution with a short shelf life. All these activities take place ahead of
multi-modal transportation followed by demand nodes (Govindan, Fattahi & Keyvanshokooh, 2017)
where the short shelf life food products meet consumption points.

4. Capitalize land rights and Right-of-Way available with IR: IR has paved the way for collaboration in
non-core operations (Sood, 2017). With ancillary service operation of IR in retail food stalls, retiring
rooms, power, platform maintenance, it has initiated a pilot initiative in inviting private investment.
The commercial rights of the parking-lot facility of Habibganj railway station in the city of Bhopal
in Madhya Pradesh are leased to a private contractor. Thus in the future collaboration will be possible
in the core operations as well. Some other projects with private participation in ancillary service
operations are Anand Vihar and Bijwasan stations in New Delhi, Chandigarh and Mohali railway
stations in Punjab state, and, Gandhinagar and Surat stations in Gujarat state. To facilitate PPP in
urban rail development, the critical factors are streamlined approval process, transparency in bidding
(Gupta, Prakash & Jadeja, 2015), and contracting process. This is only possible with strong leadership
in its Zonal Division who can implement tactical changes in the operation level of IR. This change is
not possible in the present state of affairs of IR. It will need organizational restructuring focusing on
innovation and collaboration in government subsidizing scheme with appropriate risk allocation (Liu
& Wilkinson, 2013). IR goal of land monetization from 400 stations needs a model based on factors
and variables of demand/revenue generation potential, financial risks, reclaim land from encroachment,
rehabilitation risks, debt servicing risk (Singh & Kalidindi, 2009), delay in financial closure (Babatunde
& Perera, 2017; Leigland, 2018), geographical & locational risk, and project completion risk (Baruah &
Kakati, 2016). IR can capitalize based on the demand of upstream and downstream Oil & Gas vertical
by utilizing its right-of-way and laying of pipeline transport network (Mukherjee, 2014). This diversi-
fication into pipeline business will need thorough environmental impact assessment and anticipating
of hazardous risk of spilling & transportation accidents (Wiseman, 2016, Xu, Zhang, Li, Skitmore,
Yang & F, 2019). The Construction and Open Line departments of IR are required to reshuffle their
organization structure to accommodate SCADA1010Supervisory control and data acquisition. solution
for pipeline operation & maintenance (Arora & Banerjee, 2012). The sharing of RailTel network to
Central Railside Warehouse Corporation is a pioneering initiative for Railside Warehousing facility in
20 major business hubs of India. IR land monetization asset is in the retail business district of the
cities. Streamlining of GST has paved the way for railways to leverage almost every city/town with
Central Railside Warehouses. The political ambition of Bhartiya Janata Party (Nilsen, 2018) and its allied partners in doubling the income of farmers may see the light of the day with control on distressed selling through e-Rashtriya Kisan Agri Mandi (Press Trust of India, 2017).

6. CONCLUSION

IR needs to diversify its business verticals and adopt a strategic business unit in its organisation structure. In the 14th Five-year plan, the human resource capacity of IR (Pereira, Fontinha, Budhwar & Arora, 2018) along with project management skills is to be focused in its subsidiaries venturing into international bidding for critical railway projects, suburban railway transport (Acharya, 1997), and MRTS. The subsidiaries are Indian Railway Construction Company Limited, Mumbai Railway Vikas Corporation, Rail Vikas Nigam Limited, Indian Railway Finance Corporation, Delhi Metro Rail Corporation and Rail India Technical and Economic Service Limited. The data centers of IR and Center for Railway Information Systems can leverage into payment gateway solutions, big-data, online freight management system, RFID based wagon/parcel tracking system, and GIS track system. If IR lags below 4% of India GDP during 13th Five-year plan (2017-22), it will not wrong to predict that it failed to come out of strategic flux.

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