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A Critical Review of the Freight Pricing Mechanism of Indian Railway

Anshoo Pandey

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Bharti Institute of Public Policy Research
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Abstract

Indian Railways, the world's fourth-largest railway network, has seen its freight share drop from 89% in the 1950s to a meagre 29% in 2018-19. This decline, driven by the disproportionate expansion of highways compared to railways, underscores the necessity of enhancing rail transport for economic and environmental sustainability. The current freight tariff system is overly complex and rigid, failing to accurately reflect transportation costs or market demands. While the policy has been in place for several decades, there have been growing concerns that it is no longer fit for the purpose. Reforming these policies is crucial for strengthening railways' contribution to India's logistics market and economic growth. While numerous studies have emphasised the need for revisions in the freight pricing of the Indian Railways, none have offered concrete alternatives. In recent years, Indian Railways made efforts to improve its freight rating system. The introduction of dynamic pricing has increased revenue and steps have been taken to simplify the system by reducing the number of classes and enhancing transparency. However, significant improvements are still needed. In this research paper, we critically review the present freight rating policy of the Indian Railways, identify key challenges facing the policy, and aim to address this crucial gap by proposing practical solutions to each identified problem. This study employs both primary and secondary research methodologies. Primary research involved analysing extensive data from the Centre for Railway Information Systems to assess the impact of current pricing policies. Secondary research included a qualitative analysis of over 300 freight policy circulars from the past decade, academic literature, reports, and official documents. Industry experts and stakeholders from sectors like coal, steel, cement, food grains, and containers were consulted for insights. Additionally, statistical data from government sources and industry publications were analysed using thematic, content analysis, and descriptive statistics. This comprehensive approach ensured a well-informed evaluation of the Indian Railways' freight tariff policies. The recommendations proposed for Indian Railways hold significant academic value by providing a comprehensive framework to improve freight tariff structures. By rationalising class categories, switching from slab-based rating to km-based rating, introduction to wagon-based charging, route-wise dynamic pricing and reviewing the concept of Permissible Carrying Capacity and loading tolerance, these recommendations address fundamental inefficiencies in the current system. This study contributes to transportation economics by offering data-driven, operational strategies that could serve as models for railway systems globally. By simplifying tariff structures, embracing advanced IT systems, and adopting dynamic, kilometre-based, and wagon-based charging, these changes promise increased transparency, efficiency, and accuracy.

Keywords: Freight tariffs, NTKM-based targets, Kilometre-based charging, Wagon-based charging, Rationalisation of the number of classes, route-wise dynamic pricing, review of concept of PCC, review of concept of loading tolerance.

1. Introduction

Indian Railways (IR) is the world's fourth-largest railway network and is the most critical growth engine of the Indian economy. Railways need to carry 40-45% share of the freight on economic and environmental considerations. The National Rail Plan (NRP) was released by the Ministry of Railways in 2020 to enhance the modal share of the railway to 40- 45% of the logistics market. It aims to provide a sustainable, continuous, and reliable logistics solution. Recently Indian Railways announced an ambitious loading target of 3000 million tonnes by 2030.

One of the critical challenges facing the Indian Railways freight rating policy is the falling modal share of railways. Despite being one of the major transport systems in the country, the railways share has consistently decreased over the years, from around 89% in the 1950s to only 29% in 2018-19 (Mishra, 2018). While the total freight moved by road and rail combined in 2018-19 was 4,074.5 million tonnes, only 29% was carried by rail, while 71% was taken by road. The railways share is particularly low in balanced other goods, where road transport carries a staggering 96% of the total goods moved (Indian Railways, 2020).

This clearly shows that the railways coefficient of transportation is constantly decreasing compared to roadways. One prime reason is that the growth of railway lines has not been proportional to the development of highways in India. However, railways have the added advantage of environmental and social sustainability. Therefore, there is a pressing need to increase the modal share of rail transportation.

An issue with the present freight tariff of Indian Railways is that it charges a commodity based on its class even though the cost of transportation is the same for a certain distance for all commodities. Too many classes of commodities are carried, making it difficult to understand and cumbersome. Similarly, the kilometres travelled are grouped into certain slabs, which means that the charging remains the same when the customer wants to carry goods within that distance slab. This is not desirable as it results in a tendency of the customer to transport goods to a goods shed falling within a lower distance slab. The freight structure of Indian Railways is also static and does not cater to the changing market needs of demand and supply. The freight charged is the same, irrespective of the route taken. Apart from this, there is a need to review the present concept of Permissible Carrying Capacity (PCC) and loading tolerance as these concepts limit railways loading potential.

It may be appreciated that the present freight pricing policy of Indian Railways has several challenges, which are holding back the country's economic growth. Recognising these challenges and proposing policy interventions to overcome them is important. By doing so, the railways can play a more significant role in the country's transportation system and contribute to its economic development.

2. Challenges and Solutions for the Freight Pricing System of Indian Railways: A Critical Literature Review

The transportation of goods is a critical component of any economy, and the efficiency and effectiveness of freight transportation can significantly impact economic growth. In India, the Indian Railways is the primary mode of transporting freight, and its freight pricing system has been subject to scrutiny and criticism. This literature review aims to critically analyse the existing research on the freight pricing of Indian Railways.

In a study by Kamboj and Tongia (2018), the authors highlight that the need for more transparency in freight rates has led to uncertainty among shippers, leading to a decline in traffic. The perception of arbitrary and discriminatory freight rates further compounds this lack of trust in the system. However, the freight charging mechanism of the Indian Railways is transparent and is available on its website Freight Operations Information System (FOIS) i.e. https://www.fois.indianrail.gov.in. The issue of arbitrary freight rates is highlighted in Baniamin (2011), where the author argues that the lack of a scientific approach to determining freight rates leads to arbitrary rates. The study further suggests that the use of scientific methods, such as cost-benefit analysis, can lead to a fair and transparent freight pricing system.

In recent years, the Indian Railways has attempted to address some of the issues with its freight rating system. In a report by CRISIL (2021), the authors highlight that the Railways has introduced dynamic pricing for freight rates, which has led to increased revenue. The report also highlights that the Railways has taken steps to simplify the freight pricing system, reducing the number of classes, and bringing more transparency into the system. Despite these efforts, there is still significant room for improvement in the freight pricing system. In a report by Irfan et al. (2018), the authors suggest that the Indian Railways should consider adopting a distance-based pricing model, similar to other transportation modes. The report also highlights the need for greater coordination between different zones and a more customer-centric approach to the freight pricing system.

Though there is not much in-depth literature available on the subject of freight pricing mechanism in the context of Indian Railways, the existing literature highlights the significant issues with the freight rating system of Indian Railways, including lack of transparency, arbitrary rates, and an uneven playing field. While many studies have highlighted this important issue of revision in the freight pricing of Indian Railways, none of these research works propose a possible alternative. This research paper attempts to fill this important gap and proposes a possible implementable solution to each problem.

3. Research Methodology

The research methodology used in this paper involves both primary and secondary research. Primary research involved collecting extensive raw data from the Centre for Railway Information Systems (CRIS) and analysing it specifically with the purpose of understanding the impact of present pricing policies.

The secondary research method used in this study is a qualitative analysis of existing literature, including academic articles, reports, and official documents. More than 300 existing circulars regarding the freight policy of Indian railways in the last 10 years were studied and analysed to identify the existing lacunae and ensure ease of doing business. The research also involved discussions with industry experts to obtain first-hand information and insights into implementing the existing policies and identifying the gaps to improve them. The research also involved detailed stakeholders' consultation with representatives from different sectors of the economy like coal, steel, cement, food grain and containers.

Secondary data sources were used to complement the literature review, including statistical data from official government websites, the Indian Railways yearbook, industry publications, and National Rail Plan 2020. Data was analysed using various methods, including thematic analysis, content analysis, and descriptive statistics.

The research methodology adopted in this study helped ensure the analysis was comprehensive and well-informed. By using both primary and secondary data sources, the study was able to provide a more in-depth understanding of the current freight pricing policy of the Indian Railways and identify areas where improvements could be made. The study's findings are based on a rigorous research methodology that can be replicated in future studies to evaluate the effectiveness of policy changes.

4. Falling Modal Share of Railways

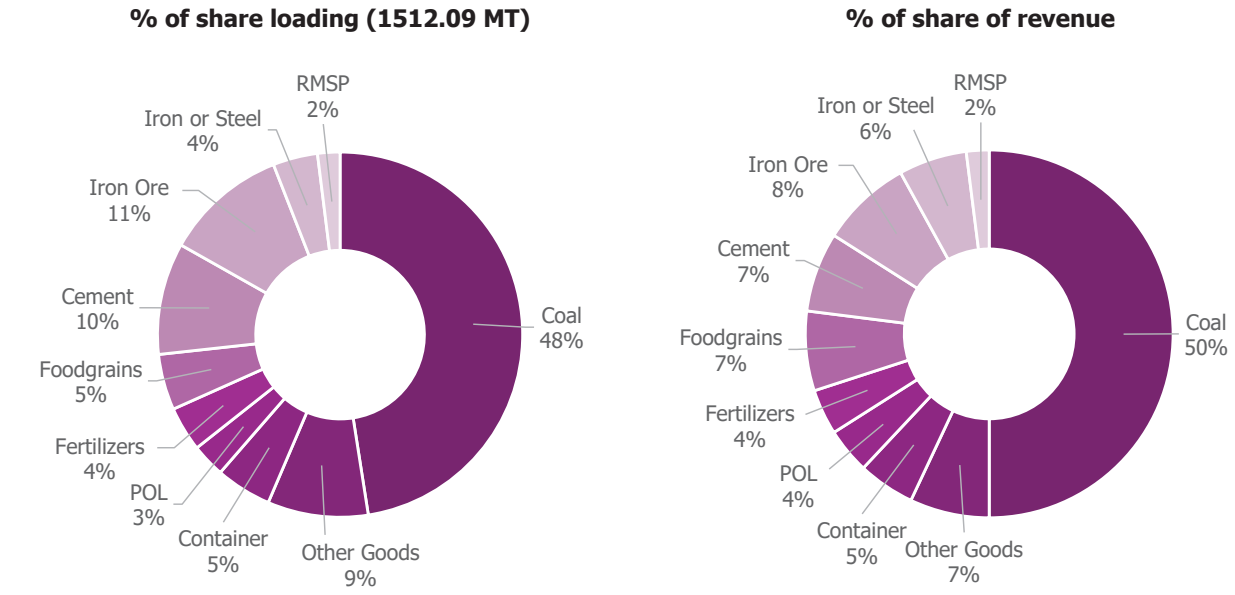
In India, the major transport systems are railways and roadways. Together they constitute more than 90% of the country's freight. In the freight segment, railways share had been consistently going down from around 89% in the 1950s to only 29% in 2018-19. The total freight moved by both road and rail combined in the year 2018-19 was 4,074.5 million tonnes, of which 1162 million tonnes (29%) were carried by rail and 2911 million tonnes (71%) were carried by road. The lowest share of rail transportation is in Balanced Other Goods (BOG), which comprises various commodities carried by containers or bulk. Transportation of 1767 million tonne of BOG was done in 2018-19, out of which road transported 1690 million tonne (96%) and only 77 million tonnes (4%) were transported by rail. This clearly shows that the rails' coefficient of transportation is constantly decreasing compared to roadways. One prime reason is that the growth of railway lines has not been proportional to the development of highways in India. However, Railways have the added advantage of environmental and social sustainability. Hence there is a pressing need to increase the modal share of rail transportation (Irfan et al., 2018).

5. Analysis of IR Freight Traffic

The loading of Indian Railways in the year 2022-23 was 1512 million tonnes and the revenue earned was ₹ 1,64,856 crores in the freight segment (Indian Railways, 2023).

This has been the highest-ever loading done and revenue earned in a financial year by IR. The commodity-wise break up of loading in million tonnes and revenue accrued in crores has been shown in Figure 1.

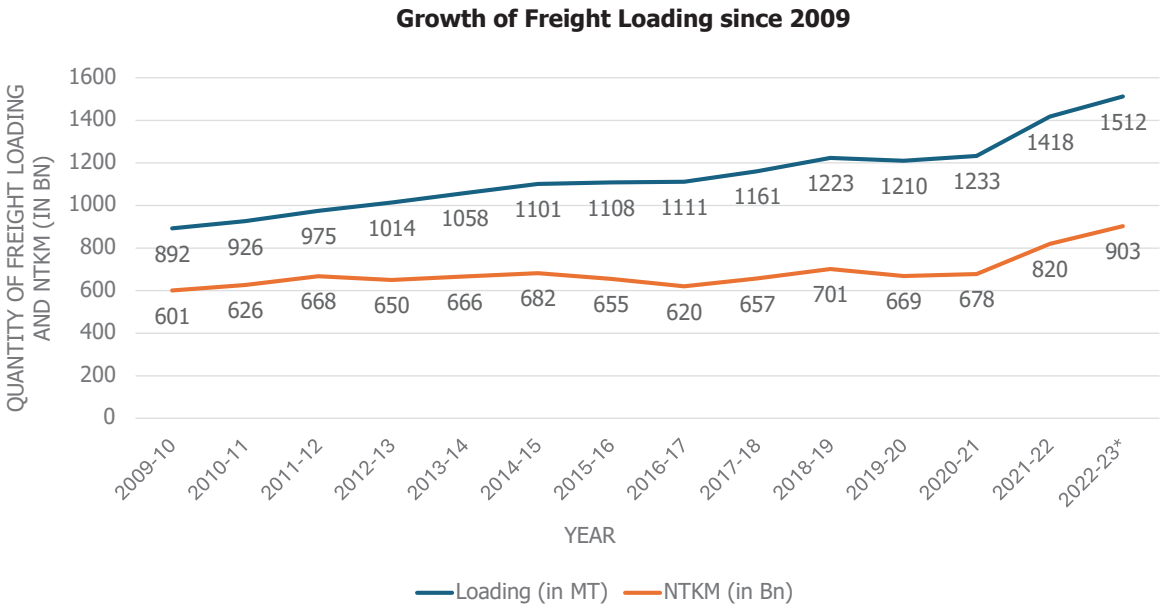
FIGURE 1: Freight commodity basket of IR in 2022-23 in loading and revenue



Note: Figure adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, March 2023.* Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

It is also important to appreciate how the trend of freight loading has been in Indian Railways in the last 15 years. There are 9 plan head commodities loaded in IR. These are coal, Raw Material for Steel Plants (RMSP), iron or steel, iron ore, cement, food grains, fertilisers, Petroleum Products (POL) and containers. All other commodities have been grouped as BOG. See Appendix A for the total loading done in each plan head commodity in the past 12 years and see Figure 2.

FIGURE 2: Trend of IR loading since 2009 in Million tonnes and billion NTKM



Note: Figure adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Annual Report and Accounts, 2023.* Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/

TABLE 1: Trend of IR loading since 2009 in Million tonnes and billion NTKM

Year	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023*
Loading (in MT)	892	926	975	1014	1058	1101	1108	1111	1161	1223	1210	1233	1418	1512
NTKM (in Bn)	601	626	668	650	666	682	655	620	657	701	669	678	820	903
	4.3% CAGR						1.9% CAGR					7.7% CAGR		

* CAGR of 9% required for achieving 3000 MT by 2030

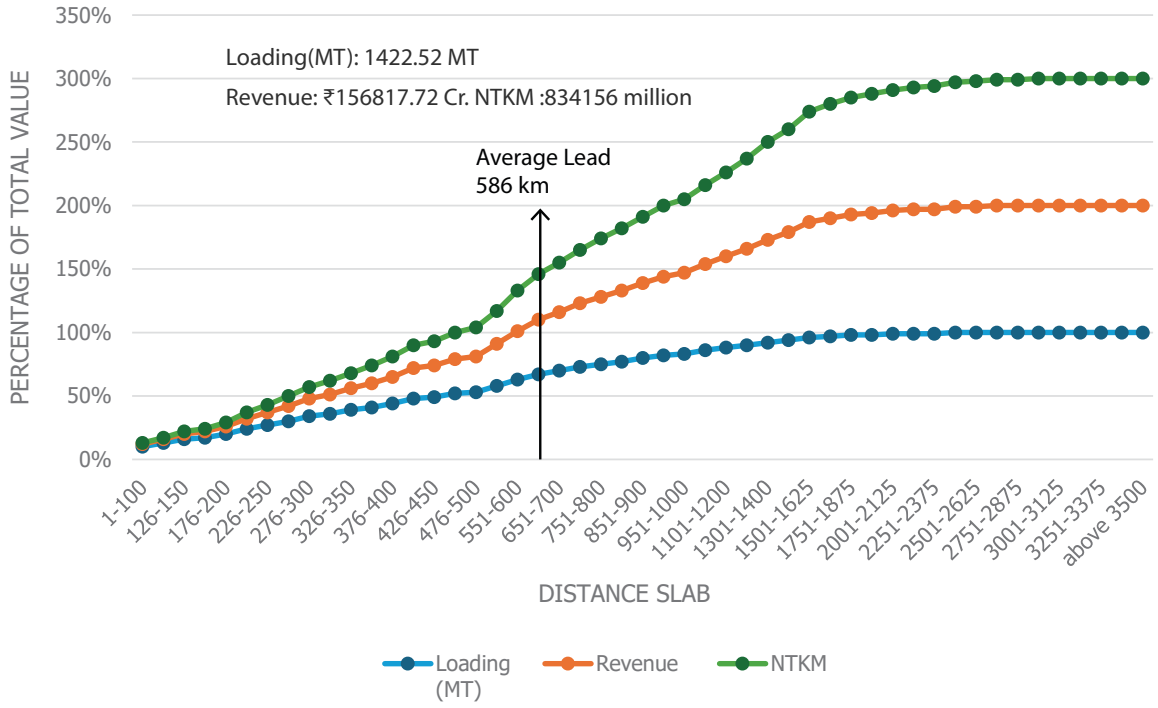
Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Annual Report and Accounts, 2023.* Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/

It may be seen that the loading of Indian Railways increased from 1008.26 million tonnes in 2012-13 to about 1509.10 million tonnes in 2022-23. This translates into a Compound Annual Growth Rate (CAGR) of only 4.12%. However, the CAGR of Gross Domestic Product (GDP) growth in the corresponding period has been 6.7%. If railways have to be the growth engine of the Indian economy in real sense, then its annual growth should be at least 1.25 times the GDP growth rate. Hence there is a need for serious intervention in policy formulation of freight pricing of Indian Railways. The CAGR in 2009-10 to 2014-15 has been 4.3% and that in 2014-15 to 2019-20 has been only 1.9%. However, the trend in the last two years has been impressive with a CAGR of 7.7%. Comparative IR freight traffic, corresponding revenue and Net tonne Kilometres (NTKM) for year 2021-22 & 2022-23 is shown as Appendix B. However, in the year 2022-23, there has been an incremental loading of about 93.25 million tonnes and incremental revenue of ₹21,000 crores compared to the year 2021-22.

5.1. NTKM: The basic unit of charging

Charging in Indian Railways is a function of both the traffic carried and the distance travelled. Hence the pricing is done in terms of NTKM. One-unit NTKM denotes traffic of one tonne moving one km. Using the above data, the loading, revenue and NTKM has been mapped in a single chart as a % of total value in Figure 3. This provides us with a good insight of how the revenue earned in % changes vis-à-vis the total traffic carried and the total NTKM carried.

FIGURE 3: Loading, revenue and NTKM as a percentage for year 2022-23



Note: Figure adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Annual Report and Accounts, 2023.* Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/

It is evident from Figure 3 that even after 50% of total loading the revenue realised is only 27%. Similarly, even after 67% of loading, the revenue realised is only 43%. Hence loading is not a true reflection of freight performance. However, revenue earned and NTKM move hand in hand and follow each other closely. Hence NTKM carried is a true indicator of the performance of Railways. Presently all the loading targets of IR are based on tonnes carried. This needs to be corrected and needs to be modified in terms of the NTKM carried. The NTKM carried by Indian Railways in the last 10 years may be seen as Appendix C.

6. Study of Freight Tariff Policies of International Railway Systems

The freight rail industry operates differently across various countries, each with its own unique system and pricing structures. In the United States (U.S), the industry is largely privatised, with seven major Class I railroads leading the sector. The charges within the U.S. freight rail system are determined by a multitude of factors, including market-driven pricing, prices tailored to specific origin-destination pairs, differentiation between intermodal and carload shipments, as well as pricing variations depending on the type of commodity being transported.

Russian Railways (RZD) oversees infrastructure and operations, with pricing divided into tariffs for infrastructure, locomotive, and wagon usage. Commodities are grouped into three classes based on transportation costs within RZD-owned wagons:

Class I: Includes raw materials like coal, ore, etc., with transportation costs exceeding 15% of the total price. Prices start at 75% of Class II tariffs for distances under 1200 km, decreasing to 55% for distances of 5000 km, with a telescopic benefit applied after 1200 km.

Class II: Covers goods such as oil, grain, fertilisers, and food items, with transportation costs representing 10% to 15% of the final price.

Class III: Encompasses chemicals, metals, machinery, and finished goods, with transportation costs comprising no more than 10% of the price. Class III tariffs are generally set 74% higher than tariffs for Class II commodities across all distances.

Germany's Deutsche Bahn (DB) AG organises freight rates based on wagon type, tonnage slab, and distance slabs. Rates remain consistent regardless of the commodity type being transported. For intermodal transport, rates are calculated per load unit, considering factors like length, total weight, and tonnage slab.

In the United Kingdom, Network Rail manages railway infrastructure, imposing mandatory access charges for all train operators. Leading freight operating companies include DB Cargo UK, Freightliner, GB Rail freight, Colas Rail, and Direct Rail Services. Freight pricing fluctuates with market conditions, varying based on shipment type and commodity. Operators pay Infrastructure Cost Charges (ICC) and Variable Usage Charges (VUC) to access infrastructure. ICCs contribute to Network Rail's fixed costs, with rates adjusted for specific commodities such as coal, iron ore, and biomass. VUCs recover track and signalling costs, itemised by vehicle class and commodity, using a per-pound-per-thousand-gross-tonne-mile (kgtm) framework.

In Australia, the Australian Rail Track Corporation (ARTC) oversees railway infrastructure across states, with key operators including Aurizon, Pacific National, Qube Logistics, and SCT Logistics. Freight is classified as bulk or non-bulk, with pricing based on commodity type and weight. Non-bulk freight includes containerised or unitised goods, transported using various wagons. Pricing flexibility accommodates diverse commodities across Australia's rail network.

The China Railway Corporation (CRC) manages China's railway system, with freight rates classified into general, special, and military categories. Rates vary by commodity type and consist of base and operating prices. Operating prices are segmented based on cargo handling categories, with the formula for whole vehicle goods incorporating freight kilometres and weight charges.

On comparative analysis with other countries' railway freight systems across various parameters such as rates per NTKM, logistics efficiency, and overall cost competitiveness, it is observed that Indian Railways Freight Rates are the highest. This is the reason for the less competitiveness of Indian freight prices on a global scale and the need to rethink the freight pricing mechanism of IR.

7. Challenges in the Present Tariff Structure

7.1. Class-based tariff

Each commodity is presently classified in a particular class based on its physical and chemical characteristics and also, its potential to pay. The present freight tariff of IR is based on the Class of commodity and the distance covered. All commodities are grouped under different classes ranging from LR3 (equivalent Class is 67) to Class 200. Traditionally, Class-100, the base class, is treated as a break-even class. All classes have fixed relativity with Class-100, e.g., Class 120 is 20% higher than Class 100, and Class 160 is 60% higher than Class 100 and so on. At present, commodities are grouped into several classes, which are LR1, LR2 & LR3 (Low tariff lines), 100, 110, 120, 130, 140, 145, 150, 160, 165, 180, 200, 100A, 120A, 130A, 145A, 180A, LR3A. The classes with the suffix A are exceptional cases. 145A is for the Coal & Coke group with different freight structures, and all other charges are included in the base freight rate. Different commodities transported by railways are charged differently based on different classes, even though the cost of transportation is the same for a certain distance for all commodities. Any tariff must be based on the incurring cost and reasonable profit margin. A fresh look into these issues is the need of the hour and merits consideration.

7.2. Slab-based tariff

The present tariff of the Indian Railways is based on kilometres travelled and the tonnes carried in a particular class. However, the kilometres are grouped into certain slabs which means that the tariff charging remains the same when the customer wants to carry goods within that distance slab. This is not desirable as it results in a tendency of the customer to transport goods to a goods shed falling within a lower distance slab.

7.3. Static nature of freight

The freight structure of IR is static in nature and does not cater to the changing market needs of demand and supply. There are times when the demand is very high and there is a shortage of wagons. Similarly, there are times when the demand is relatively less, and wagons are freely available for loading. There are sections which are highly saturated, and it is very difficult to get the movement done across such sections. However, at the same time there are sections with a low line capacity where movement is relatively easier. The average speed of different types of rolling stock is also different. However, Railways charge the same freight for the same distance without taking into consideration the congestion in the route traversed, the type of stock used to carry the goods, and the speed of the stock and the transit time.

7.4. Fully distributed cost

The freight charges on Indian Railways are often estimated using fully distributed cost rather than the marginal cost principle. A fully distributed cost system allocates all costs associated with a product or service, including direct and indirect expenses, across various cost centres or activities. This method ensures that all costs are accounted for and properly attributed to the products or services being

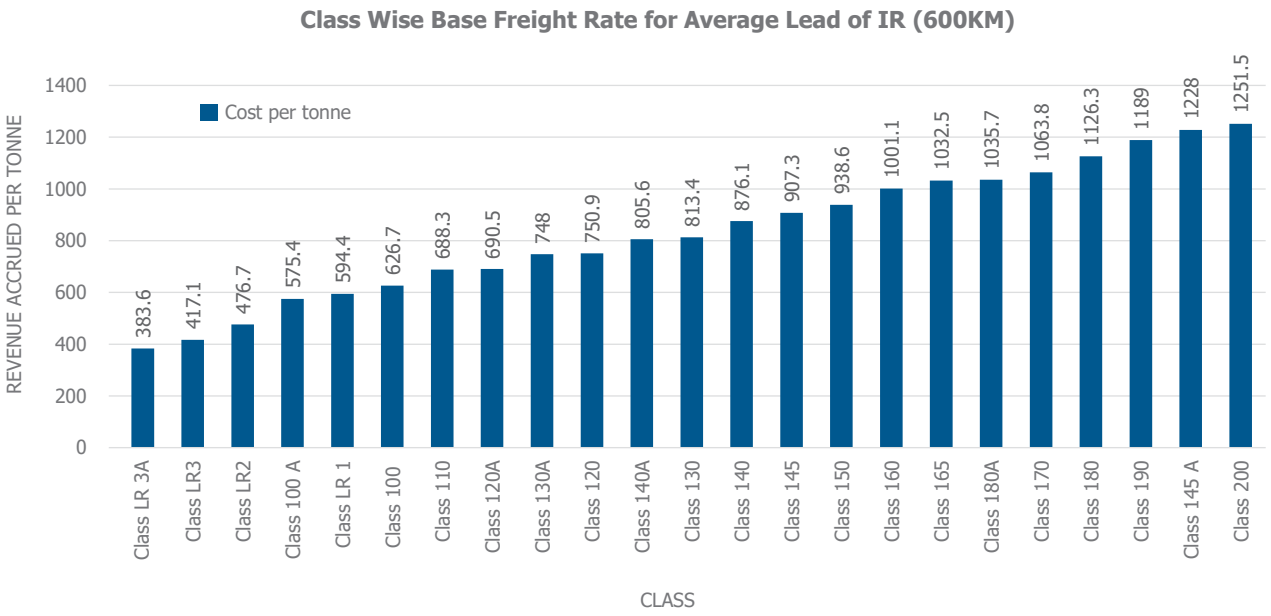
produced. This approach tends to smooth out pricing fluctuations but may not accurately reflect the actual cost of transporting goods, particularly for longer distances or specialised cargo. Critics argue that adopting a marginal cost principle could lead to a more efficient allocation of resources and better reflect the true economic cost of transportation. By pricing each unit of service at its marginal cost, the railway system could potentially operate more efficiently and allocate resources more effectively.

8. Rationalisation of the Number of Classes and their Meaning

Before 2005, the number of commodities classified to be loaded by Indian Railways was more than 4000. Hence, searching for the commodity class to be loaded was a cumbersome process. These commodities are in the goods tariff published by the Ministry of Railways. In 2005, a need was felt to rationalise this large number of commodities. The total number of commodities loaded by IR was reduced from 4000 to about only 400. This number has now increased to about 660 commodities at present. A similar type of commodities was further classified into main commodity heads. Presently, there are only 25 commodity heads in the goods tariff. Each commodity head largely represents a particular class of charging. The highest Class of charging was fixed as 200, while the lowest Class was LR3 (Baniamin, 2011).

Despite this rationalisation done in 2005, there is still a pressing need to reduce the number of classes as it makes the process cumbersome. The business partner may give a false declaration of a commodity loaded to a lower class to save some money in freight charges. In order to find an alternative solution for reducing the number of classes it is important to analyse the traffic loaded in each class in the last few years and the corresponding revenue generated. This primary data was collected from Centre for Railway Information system (CRIS). An analysis of the quantum of traffic loaded in each class and the revenue accrued therein has been shown as Appendix D. It may be seen from the appendix that the maximum traffic of Indian Railways is carried only in seven classes which are 145A, 165, 140A, 130A, 180A, 150 and 145. About 94% of the total traffic is carried in these seven classes alone generating about 95% of the revenue while the bottom 16 classes give only 6% of the traffic. So many classes not only make the tariff structure cumbersome but also very difficult to understand for the customer. A graph showing the revenue accrued per tonne for each class for average lead of 600 km has been shown in Figure 4.

FIGURE 4: Class wise Base Freight Rate for Average Lead of IR (600km)



Note: Figure created by author using data from Centre for Railway Information Systems (2023).
Source: Centre for Railway Information Systems. (2023). *Class wise Base Freight Rate for Average Lead of IR (600km).* Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

8.1. Proposed solution for reducing number of classes

To reduce the number of classes, it has been assumed that the quantum of traffic in each class remains the same even after rationalisation. This is done to arrive at a revenue neutral model of rating which means that the revenue earned after merger of classes remains the same as present. The classes which are closest in rating have been chosen to be merged in one to cause minimum inconvenience to the customer. Class 145A will remain a separate class due to a separate rating structure for coal. Hence the following seven classes are proposed as shown in Table 2.

TABLE 2: Proposed new classes for Indian Railways

Name of Merged Class	Classes merged
Coal	145A will remain a separate class.
Petroleum & Gases	200, 190, 180 & 170 class
Mineral & Ores	180A, 165 and 160 class
Building material class	150, 145 and 140
Food grain & Edibles	130, 140A, 120 & 130A (119)
Other Essential Commodities	120A, 110 & 100
Social sector obligations	100A, LR1, LR2, LR3

Source: Created by Author

TABLE 3: Tabular representation of the proposed merger of classes

Class	Loading (MT)				Revenue Rs in Cr.		Average Lead(Km)		Equivalent Class	
	2021-22		2022-23		2021-22	2022-23	2021-22	2022-23		
145A	645.27	48%	718.59	51%	67291.97	82188.41	480	531	199	Coal Class
200	0.17	0%	0.14	0%	9.68	7.01	188	174	190	Petroleum & Gasses Class
190	0.01	0%	0	0%	0.96	0	570	0		
180	8.37	1%	7.91	1%	907.55	892.01	571	552		
170	0.68	0%	0	0%	120.33	0	946	0		
180A (166)	41.7	3%	46.4	3%	5529.41	6133.23	641	637	164	Mineral Class
165	222.72	17%	213.24	15%	22097.46	22464.69	494	499		
160	10.73	1%	10.58	1%	631.16	623.24	304	286		
150	48.19	4%	47.46	3%	3088.38	3350.02	342	345	145	Building Material Class
145	37.12	3%	36.39	3%	3037.7	3359.4	523	526		
140	15.24	1%	15.94	1%	631.55	781.57	247	271		
130	3.76	0%	3.03	0%	595.55	587.81	1221	1324	125	Food Grains and other edibles
140A (129)	141.3	11%	149.2	11%	10926.03	12721.41	538	543		
120	3.38	0%	2.93	0%	613.6	616.18	1452	1530		
130A (119)	115.46	9%	122.92	9%	16544.89	17659.65	1131	1026		
120A (110)	10.83	1%	13.33	1%	949.99	1203.2	887	877	107	Other essential commod-ities
110	0.23	0%	0.2	0%	29.81	34.97	1061	1409		
100	12.69	1%	13.77	1%	1219.64	1295.75	840	760		
LR3	**2.14**	0%	**2.46**	0%	**257.22**	**320.95**	1697	1721	78	Low rated com-modities including Salt
LR1	**2.19**	0%	**1.58**	0%	**210.44**	**146.82**	941	898		
LR3A	**1.25**	0%	**1.39**	0%	**118.15**	**143.54**	1434	1464		
LR2	**0.29**	0%	**0.63**	0%	**38**	**75.63**	1827	1501		
100A	**8.04**	1%	**8.85**	1%	**1044.5**	**1248.48**	1362	1374		
Total	**1331.76**		**1416.94**		**135893.97**	**155853.97**				

Since salt (Class-100A) is an essential commodity, it is proposed to be charged at par with LOW RATED COMMODITIES

Note: Table created by author using data from Indian Railways (2018).
Source: Indian Railways. (2018). *Freight rate circular RC-19 of 2018.* Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/traffic_comm/downloads/Freight_Rate_2018/RC_19_2018.PDF

The summary of proposed merger of classes can be shown in a tabular form (Table 3) wherein each merged class has been shown by a separate colour. For each of these merged classes an equivalent class has been calculated based on the assumption of same level of traffic and revenue accrued after merger. The equivalent class is determined by calculating the average total revenue and total loading for each group. Instead of directly setting a base freight, the derived average is compared against the standard freight table of the Indian railway, available in public domain. Subsequently, the equivalent class is calculated.

8.2. Revenue implications

The revenue implication of such merger with detailed calculation of the estimated revenue lost/gained in each class can be shown in detail as given in Appendix E. For each new class proposed an equivalent class has been shown to understand how the new class of rating compares with the existing classes. Further an estimate of gain/loss of revenue has been indicated against each of the existing classes assuming that the quantum of traffic in each class remains the same. Hence, the overall revenue of IR has been assumed to remain the same.

Switching over to this new system of pricing will certainly be a challenge as it will invite mixed reactions from the industry. Sectors that tend to gain from this new structure shall be welcoming this change whereas the sectors that tend to lose are likely to oppose this new system of rating. However, once it is implemented it is likely that trade will adjust to it as it is simple and easy to understand.

9. Dynamic Pricing Policy

Till 2005, IR had a fixed price policy, irrespective of demand scenario and competition. In order to be able to face the challenges posed by stiff competition effectively, a Dynamic Pricing Policy was introduced for freight, peak and non-peak seasons. As per this policy, the tariff for the non-peak season, non-premium service and empty flow directions would be less than the general tariff, and the tariff for peak season and premium services could be higher than normal (Baniamin, 2011). This was charged from October 1 each year to June 30 next year. This busy season charge was discontinued from the year 2019 and was again resumed from 1st October 2022 by issuing a rate circular on September 22, 2022. However, this is not dynamic pricing in the true sense as price remains static for 9 months of the year.

9.1. Route based charging

Presently the charging is based on the distance travelled by the commodity, irrespective of the congestion in the route. A better index of Dynamic Pricing for Indian Railways would be route-wise charging as there is different level of congestion across all routes. There should be a premium charged in freight if the customer intends to carry his goods from the congested route. Similarly, a discount may be offered for the lesser utilised routes. The routes may be identified based on the actual number of running trains on a section. This is termed as line capacity of a section. The figure of line capacity utilisation of 2022-23 of a section may be used for this purpose.

Based on the utilisation of a section, it may be segregated as:

I. Highly/ severe congested route (Capacity utilisation >130%)

II. Congested route (90% < Capacity utilisation< 130%)

III. Less congested route (Capacity utilisation < 90%)

For the above routes, the proposed freight rates are as given in Table 4.

TABLE 4: Proposed route-wise freight charging for Indian Railways

Routes	Capacity Utilisation	Proposed base freight rates
Highly congested routes:	≥130%	Base freight rate + 15%
Congested routes:	≥90% < 130%	Base freight rate
Less Congested routes:	<90%	Base freight – 15%

Source: Created by Author

At present, Busy Season Charge is levied at 15% during busy season. If the tariff proposed as above is implemented, Busy Season Charge should be withdrawn by Indian Railways. If a freight train moves from origin station A to destination station B, then the charging may be done section-wise depending on the congestion in the specified section travelled.

9.2. Wagon-wise charging (Introducing Haulage charge for IR wagons)

The principle of 'what the traffic can bear' is the most important consideration for different commodity classifications. It does not take into consideration the different types of stocks in which the commodities are transported, and the cost incurred therein. Hence, charging for a commodity is independent of the type of stock used. Predominantly, the stocks can be grouped broadly into four categories, i.e., Open, Covered, Flat and Tank wagons.

1. Open wagons are utilised for loose/bulk commodities like coal, iron ore, dolomite, gypsum etc., in which IR is in a dominant position.
2. Covered wagons are utilised for bagged commodities like cement, fertilisers, salt, sugar, etc. In this segment, especially for cement, IR is facing stiff competition from road, particularly in a shorter lead segment (<400 kms). Many low volume/value and essential commodities are also transported in covered stocks.
3. Flat wagons are utilised for finished steel stocks, which are high-rated commodities.
4. Tank wagons deal with POL, water etc. In POL transportation, Railways is facing stiff competition from the pipeline segment.

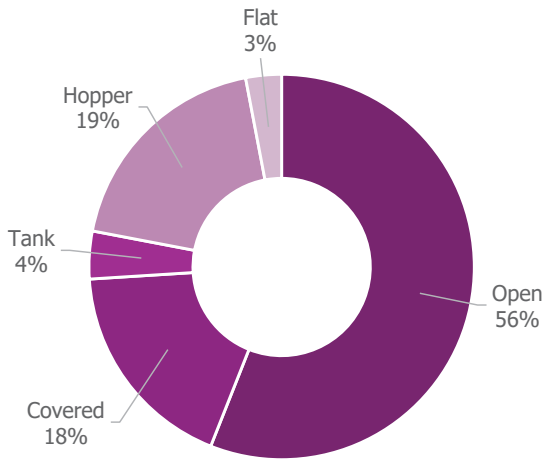
The quantum of traffic carried in each type of wagons is shown in Appendix E. On the Indian Railways, 53% of traffic is booked in Open wagons, within which the percentage share of coal traffic is around 70% and iron ore is 74%. 18% traffic is booked in hopper wagons, in which 29% of coal traffic and 26% iron ore are booked. Thereafter, 17% of the total IR traffic is booked in covered wagons, on which around 100% of food grains & fertiliser and 85% of cement (excluding clinker) is carried and balance 12% of IR traffic are booked in container, flat and tank wagon, automobile, etc. Percentage of IR traffic booked in various wagon groups in 2022-23 is as shown in Table 5 and Figure 5.

TABLE 5: Quantum of traffic booked in each type of wagon in tabular form

Wagon type	Tonnage (MT)	% age Share
Covered	259.6	18%
Open	792.3	56%
Flat	34.0	2%
Hopper	270.8	19%
Tank	59.2	4%

Note: Table created by author using data from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Freight Rate Circular, 2023.* Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

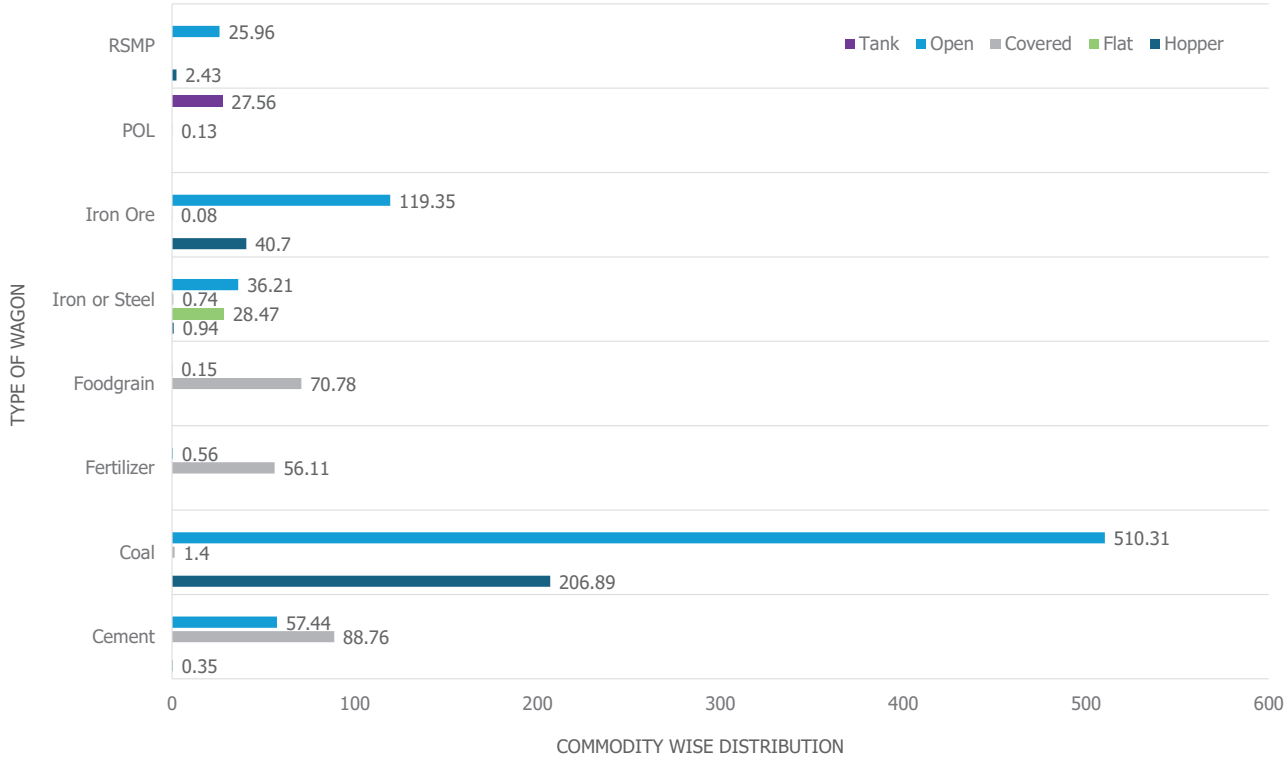
FIGURE 5: Percentage of IR traffic booked in each type of wagon in pie-chart



Note: Figure created by author using data from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Freight Rate Circular, 2023.* Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

The commodity wise distribution of the traffic carried in each type of wagon has been shown in Figure 6 to understand the impact of wagon-based charging/haulage charge on each commodity. It may be seen that cement is predominantly transported in both open (57.44 MT) and covered wagons (88.76 MT), coal is carried in both open wagons (510 MT) and hopper wagons (206 MT) and iron & steel is carried in both flat (28.47MT) and open wagons (36.21MT).

FIGURE 6: Types of wagons used for carrying major plan head commodities of Indian Railways



Note: Figure adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, March 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

Presently, the type of wagon used for transportation is not accounted for while charging freight from the customer. IR levies the same freight charges from the customer for transporting goods from Station A to Station B, irrespective of the type of wagon used. It is incorrect as these wagons have different carrying capacities, tare weights, speeds and numbers of wagons used for rake formation.

9.2.1. Proposed solution

A possible solution may be the charging based on haulage charge irrespective of the commodity carried as is done in case of containers. However, this haulage charge shall be specific to the type of wagon in which it is transported. There will be separate haulage rates for four groups of stocks i.e. Open, Covered, Flat and Tank wagons. Even within each type of these wagons there are many subtypes with minor variations of PCC. The charges for these wagon types need to be in accordance with the revenue earned by these wagons assuming the present level of traffic. The detailed calculation to arrive at a

revenue neutral model for IR assuming the present level of traffic for each commodity has been shown as Appendix F. The wagon-wise calculation in Appendix F can be summarised as shown in Table 6.

TABLE 6: Wagon wise average lead and proposed equivalent class, haulage charge per wagon

Type of wagon	Average Lead (km)	Equivalent class	Proposed Haulage (₹) per wagon at average lead
OPEN	615	182	85422
COVERED	834	137	76194
HOPPER	184	223	33892
FLAT	924	184	114580
TANK	637	193	68625

Source: Created by Author

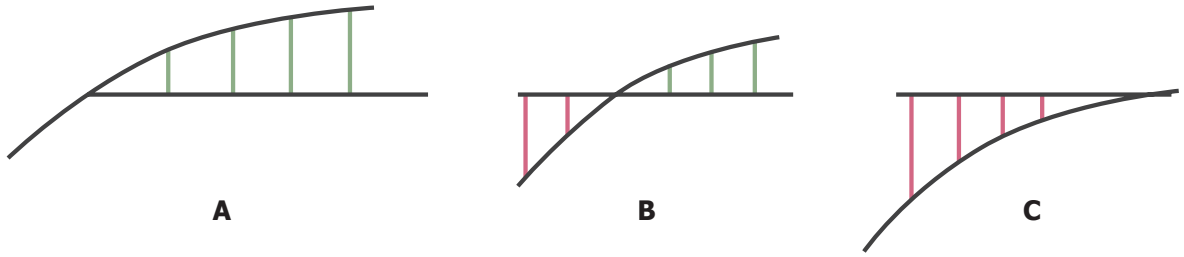
10. Switching from Slab-based Tariff Charging to Distance-based Tariff Charging

Rates for goods, passenger, parcel, container, etc., have been notified in the slabs of distance traversed. Charges are fixed based on the slabs of km as given in the freight tariff. There are fixed charges for any distance within a particular slab. This slab-based charging is an old concept when preparation of Railway Receipt (RR) was done manually and hence all the calculations corresponding to such freight charging were done manually. However, this concept has lost its relevance today as all preparations of RR and subsequent freight calculations are done electronically by the Terminal Management System (TMS). Hence Indian Railways must immediately leave this archaic practice of slab-based tariff charging and switch over to the kilometre-based tariff. In kilometre-based tariff model, there shall be a fixed tariff up to a certain minimum distance (say 100km); thereafter, the tariff will be different for each kilometre. Hence the customer shall be paying exactly for the distance travelled without any slab-based generalisation of tariff.

10.1. Proposed solution

The solution lies in converting the existing step function of rates into a continuous function which changes continuously with kilometres. There can be three options for this purpose as shown in Figure 7.

FIGURE 7: Three Possible Models for Shifting from Slab-based charging to KM based Charging



Source: Created by Author

Option A

This model proposes the continuous function above the step function. It will always calculate the tariff more than the existing slab-based tariff and hence Railways will get more revenue. However, the purpose of this analysis is to ease the customer by providing better services, hence this model is not desirable as customers tend to pay more.

Option B

This model proposes the continuous function based on the line of best fit. It is the best model as it is based on minimising the difference between the step function and continuous function. Some customers will tend to lose, and some will tend to gain by this model, however the revenue will almost be the same as the present revenue. Hence, this model is most suitable and should be adopted by the Indian Railways for switching over to kilometre-based tariff charging.

Adoption of this model will ensure that there are no abrupt changes in the tariff compared to existing tariff. It will also discourage the tendency of the customer to book goods to a terminal falling in a lower distance slab in order to save revenue even though such a terminal may be heavily congested. As per this model, detailed calculation for each type of commodity can be done by using a continuous function. However, this calculation is beyond the scope of this research paper.

Option C

This model proposes the continuous function below the step function. It will always calculate the tariff less than the existing slab-based rates and hence railways will lose revenue in this model. Hence, this model is not desirable as railways will lose a lot of revenue.

11. Review of Permissible Carrying Capacity of Different Wagons

Concept of PCC and its adoption by IR: Prior to 2005, charging of a commodity in a wagon was done based on the notified Minimum Weight Condition (MWC) of the commodity or based on Carrying Capacity (CC) which was painted on the wagons called stencilled CC or marked CC. For certain wagons, chargeable weight was being notified in terms of CC+ tonnes where CC was the marked CC of the wagon. The loading of tolerance of two tonnes was available over and above those PCC

for the purpose of levying of penalty for overloading in wagons (Rates Circular 22, 31 & 48 of 2004). Evidently, PCC of eight-wheeler BG wagons which was notified as CC+ basis, corresponds to axle load more than 20.32 tonnes.

From 2005, minimum weight condition was done away with, and it was decided that charging of commodities will be done based on the permissible carrying capacity of wagons irrespective of the loading potential of the commodity in that wagon. In some case, PCC was CC of the wagons and in some case, it was enhanced CC i.e. CC+ basis (Rates Circular 17/2005).

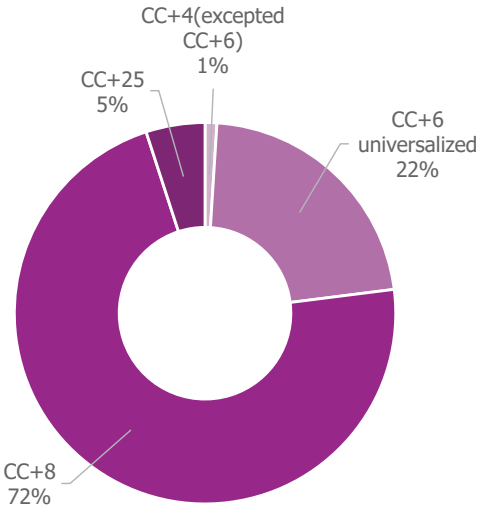
Permissible Carrying Capacity of a wagon is being arrived at based on two parameters i.e., axle load limit of track (track strength) and the capacity of a wagon designed for that axle load. The Civil Engineering Directorate deals with the axle load of the route and the Mechanical Engineering Directorate decides the axle load for wagons. Thus, axle load for a wagon is the limiting factor while calculating the PCC of a wagon on a particular route.

11.1. Types of routes in Indian Railways

Routes are classified as CC+4, CC+6+2t, CC+8+2t and 25ton routes, based on the permissible axle load of wagons, decided by track structure available on a particular route. Presently, CC wise IR route km is as shown in Figure 8.

FIGURE 8: Route-wise distribution of total track km of IR in pie chart and tabular form

IR Route km
Route Kms
Upto 2022-23



Type of Routes	IR Route (In Kms)
CC+4(excepted CC+6)	792
CC+6 universalized	18483
CC+8	62307
25 tonnes	4496

Note: Figure adapted from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Route-wise distribution of total track km of IR*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

Operation of different axle load wagons is permitted at different speeds based on the stipulated minimum track structure given in Appendix G. Permissible axle load is mainly governed by the stresses induced in the rails. To avoid sudden failure and increase in defect generation rate in rails, the total rail stresses should be within the yield stress of rails. Thus, the PCC of different wagons should be defined

in such a way that the resultant axle load coming to track is limited to the permissible axle load of the route. The permitted axle load of different routes on IR track is given in Table 7.

TABLE 7: Route-wise permitted axle load on IR

Type of Route	Axle Load
CC	20.32t
CC+2+2t	21.32t
CC+4+2t	21.82t
CC+6+2t	22.32t
CC+8+2t	22.82t/22.9t
25 ton	25t

Note: Table adapted from Indian Railways (2019).
Source: Indian Railways. (2019). *Rates Master Circular/PCC/2019/0*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/traffic_comm/Rates_Master_Circulars/2019/PCC%20of%20wagons_16052019.pdf

11.2. Calculation of PCC

Presently, the permissible carrying capacity of a wagon is calculated using the formula:

*PCC= 4*axle load (permitted on different routes)- designed tare weight-loading tolerance*

At present, the figure arrived based on the above formula is rounded off to the nearest lower integer to keep the gross weight within the permissible axle load. Since the rounding off is done on the lower side, there is a considerable gap between the permissible axle load and gross load in a wagon. This results in loss of carrying capacity as well as loss of revenue for Indian railways. *It is recommended that PCC of the wagons based on the above formula may be rounded off to one decimal point. This will help in increasing the carrying capacity of all wagons without incurring any extra expenditure.*

For example, tare weight for BOXNHA wagons is 23.17t. Permitted axle load is 22.9t and loading tolerance is 1 tonne. With this figure, PCC of BOXNHA wagons as per the formula would be:

PCC = 4 x 22.9 – 23.17 -1 = 67.43 which is being rounded off to 67 tonnes. If the proposed rounding off to one decimal point is considered, the PCC of a BOXNHA wagons would be 67.4tonnes, which implies 0.4 tonnes more in each wagon which translates into 23 tonne additional traffic in one rake.

Such rounding off will result in higher PCC of a wagon without breaching the permissible axle load limit. Estimated additional earnings by this step will be approximately ₹343.72crores per annum. The detailed calculation has been shown as Appendix G.

12. Review of Loading Tolerance

Loading tolerance is necessary as it allows for minor variations in weight due to factors such as weather, packaging, and weighing inaccuracies. It also helps to ensure that the loaded wagons do not exceed their permissible gross weight, which can have safety implications for the train and the track. Additionally, it helps to maintain fairness in the freight transportation industry by ensuring that shippers do not pay extra charges for minor variations in weight.

Loading tolerance is also a reflection of precision needed in the loading process. Higher is the precision of loading, lesser will be the loading tolerance required. The loading of bulk commodities in wagons is done either mechanically using silos through a chute mechanism or manually loaded through a pay loader. The chances of overloading are more in the mechanical system of loading as it is based on heuristics and there is no way to ascertain the actual quantity loaded in each wagon. Hence the permissible carrying capacity is kept a little less than what can be actually loaded to account for inaccuracy in loading and weighment. This margin of error due to relative precision in loading is technically called loading tolerance.

At present, loading tolerance is one tonne for most of the wagons. There is a need to review the loading tolerance as it is not just a loss of carrying capacity but also a loss of revenue for Indian Railways. Loading tolerance for open stock may continue to be one tonne when consignment is weighed on Electronic in Motion Weigh Bridge (EIMWB).

For those cases where weighment is done at pre-weigh-bin/weightometer, the loading tolerance should be changed to 0.5tonne. Similarly, for bagged consignment (when loaded in covered wagons), loading tolerance may be revised as 0.5 tonne.

However, if the loading tolerance for all the wagons of IR is reduced from 1 tonne to 0.5 tonnes, then PCC will also increase by 0.5 tonnes per wagon without compromising safety. This will generate additional revenue for Indian Railways without any extra expenditure. As per the wagon-wise loading figures of 2022-23, the detailed calculation for the extra revenue earned by rounding off the loading tolerance to 0.5 tonne has been calculated as Appendix H.

It may be seen that if the loading tolerance of all types of wagons in Indian Railways can be reduced from 1 tonne to 0.5 tonnes, then an extra revenue of ₹1199.51 crores will be accrued without incurring any extra expenditure. This would need installation of pre-weighbin at each freight terminal whether it's a private siding or a goods shed.

13. Policy Suggestions/Recommendations

Following eight policy recommendations are made for Indian Railways for complete change in its present rating policy. Introduction of these changes will make freight tariffs not only easy and simple to understand but also more competitive.

13.1. NTKM based targets

The target set by Indian Railway should not be based on tonnes carried. It should be based on NTKM which is a true reflection of freight performance as it includes both the tonnage carried and distance traversed.

13.2. Reduction in the number of classes

As proposed above, the number of classes needs to be rationalised and reduced to only 5 classes above 100 and one class below 100, compared to 23 at present.

13.3. Wagon based charging

Since different wagons have different turnaround time, hence Railways should introduce wagon-based charging depending on the type of wagon used for transportation. Railways should only levy haulage charge irrespective of the commodity carried as is being done in case of containers.

13.4. Introduction of kilometre-based charging

The slab-based charging is archaic in nature and has long lived its utility. Hence with the advent of advanced Information Technology (IT) systems like FOIS, Indian Railways must switch over to km-based charging which will ensure more transparency in its tariff charging mechanism.

13.5. Doing away with the concept of PCC

An inherent drawback in the system of PCC is that it ignores the variation in weight of individual wagons and hence is a potential safety threat. Hence, it is recommended that the charging on Indian Railways should not be based on PCC but on the gross weight permitted on the track. The quantity to be loaded in each wagon should be decided based on the actual tare weight of the wagon.

13.6. Rounding off PCC to one decimal point

The PCC of wagons should be arrived at by rounding off to one decimal point on the lower side. For example, if PCC comes to 60.78t, it will be rounded off to 60.7t and not 60 tonnes as is being done presently.

13.7. Reducing loading tolerance from 1 tonne to 0.5 tonne

a. Loading tolerance of 1 tonne for bulk commodities (Open stock/Flat stock) will continue when weighment is done at EIMWB. However, when weighment is done on a pre-weigh bin/ weightometer, the loading tolerance will be 0.5 tonnes only. No further weighment of these rakes needs to be done at EIMWB.

b. For loading of bagged consignment of standard sizes in covered wagons, the loading tolerance may be reduced from 1 tonne to 0.5 tonne.

13.8. Adopt new system of loading

Loading system, wherein silo is coupled with static weighbridge and pre-weigh bin may be tried on an experimental basis by Indian Railways to see its efficacy on IR. It will not only ensure accurate loading in each wagon duly taking into account the tare weight but will also ensure safety. Railways should promote the installation of silo system of loading at all sidings by giving suitable concession in freight. This silo system of loading coupled with pre-weighbin/weightometer is more accurate than the traditional Electronic in Motion Weighbridges (EIMWB).

14. Conclusion

The rating system of Indian Railways needs a thorough revamp. The present structure of rating is not just old and unscientific, but is also preventing Indian Railways from earning its true potential. If the above-mentioned recommendations are implemented, it would lead to an immense possibility for the Indian Railways to increase its freight share and become truly competitive globally.

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Appendix

APPENDIX A: Commodity wise loading details from 2012-13 to 2022-23

Commodity Name	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Coal	496.42	508.06	545.81	551.52	532.83	555.20	605.84	586.87	541.82	652.80	727.24
RMSP	15.60	17.33	18.28	20.29	22.75	23.77	25.77	25.57	24.9	29.03	28.39
Iron or Steel	35.31	38.95	42.84	44.79	52.41	54.36	53.98	53.13	60.06	68.50	66.36
Iron Ore	111.41	124.27	112.77	116.94	137.55	139.80	137.34	153.37	159.13	168.36	160.14
Cement	105.87	109.80	109.80	105.35	103.28	112.96	117.34	110.1	120.40	137.19	144.22
Foodgrains	49.20	55.09	55.47	45.74	44.86	43.79	39.31	37.53	62.82	73.38	70.92
Fertilisers	46.21	44.70	47.41	52.23	48.34	48.53	51.84	51.39	53.79	49.18	56.35
POL	40.61	41.16	41.10	43.24	42.42	43.11	43.01	44.68	42.48	44.46	48.22
Container	41.04	43.52	48.38	46.18	47.35	53.94	60.17	61.08	63.16	74.26	79.22
BOG	66.59	68.76	73.40	75.37	74.35	84.09	86.89	84.69	102.38	118.71	128.06
Total	**1008.26**	**1051.64**	**1095.26**	**1101.51**	**1106.15**	**1159.55**	**1221.48**	**1208.42**	**1230.94**	**1415.87**	**1509.10**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Annual Report and Accounts, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/

(BOG: Balance other goods, POL: Petroleum products, RMSP: Raw material for steel Plants)

APPENDIX B: Comparative IR Freight Traffic 2021-22 & 2022-23

Comparative IR Freight Traffic 2021-22 & 2022-23										
Commodity Name	Loading (MT)		Earnings (₹ in Cr.)		NTKM(Million)		Yield per NTKM (in ₹)		Avg. Lead (KM)	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022- 23
Coal	652.46	727.24	67228.47	82122.60	308997	380819	2.18	2.16	474	524
RMSP	28.89	28.39	2446.19	2661.41	15789	15266	1.55	1.74	547	538
Iron or Steel	67.89	66.36	9136.59	10359.53	52072	54289	1.75	1.91	767	818
Iron Ore	168.35	160.14	13342.76	12532.04	61843	55793	2.16	2.25	367	348
Cement	138.56	144.22	10800.77	12428.80	75456	79223	1.43	1.57	545	549
Foodgrains	73.395	70.92	11446.51	10880.47	93835	80670	1.22	1.35	1278	1137
Fertilisers	49.18	56.35	5644.27	6925.96	41925	47149	1.35	1.47	852	837
POL	44.45	48.22	6019.44	6467.03	29202	31250	2.06	2.07	657	648
Container	74.26	79.22	7056.40	7859.46	62356	67638	1.13	1.16	840	854
BOG (with Misc)	118.42	128.06	10322.47	12205.57	76605	88112	1.35	1.39	647	688
Total	**1415.85**	**1509.10**	**143443.87**	**164442.87**	**818081**	**900208**	**1.75**	**1.83**	**578**	**597**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

APPENDIX C: Comparative Class wise IR traffic 2021-22 & 2022-23

Comparative Class wise IR traffic 2021-22 & 2022-23								
Class	Loading (MT)		Revenue (Rs in Cr.)		NTKM (in million)		Average Lead (in Km)	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
145A	645.27	718.59	67291.97	82188.41	309563.89	381442.37	963.58	1176.80
165	221.97	212.51	22047.87	22413.51	109658.53	106057.01	1230.19	1238.56
140A	141.30	149.20	10926.03	12721.41	76002.65	80950.86	913.54	841.33
130A	115.46	122.92	16544.89	17659.65	130585.13	126084.88	1900.69	1789.28
150	48.19	47.46	3088.38	3350.02	16504.54	16364.36	532.66	541.81
180A	41.70	46.40	5529.41	6133.23	26723.22	29563.74	962.68	1001.83
145	37.12	36.39	3037.70	3359.40	19411.18	19142.87	1197.58	1131.63
140	15.24	15.94	631.55	781.57	3756.55	4317.65	535.20	512.82
100	12.69	13.77	1219.64	1295.75	10659.52	10464.06	1468.51	1625.23
120A	10.83	13.33	949.99	1203.20	9607.27	11699.41	1149.84	1122.06
160	10.73	10.58	631.16	623.24	3256.26	3023.22	741.68	497.66
100A	8.04	8.85	1044.50	1248.48	10943.94	12165.27	2714.51	3400.84
180	8.37	7.91	907.55	892.01	4776.75	4370.01	1016.40	1030.21
130	3.76	3.03	595.55	587.81	4583.38	4009.65	2136.13	2174.38
120	3.38	2.93	613.60	616.18	4904.64	4480.13	2666.65	2748.36
110	0.23	0.20	29.81	34.97	245.13	284.58	1981.02	2284.07
200	0.17	0.14	9.68	7.01	32.55	23.85	618.04	282.92
170	0.68	0.00	120.33	0.00	645.86	0.00	945.08	0.00
190	0.01	0.00	0.96	0.00	4.56	0.00	579.74	0.00
Total	**1325.13**	**1410.15**	**135220.57**	**155115.84**	**741865.54**	**814443.91**	**24253.72**	**23399.79**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

APPENDIX D: Revenue Implications of Merged classes

D1: Coal class

(Class-145A)											
Class	Class wise IR Traffic for the year 2022-23						Equiv-alent Class (EC)	Estimated Revenue (₹ in Cr.)			
	No. of wag-ons	Load-ing (MT)	Reve-nue (₹ in Cr.)	NTKM (mil-lion)	Avg Lead (KM)	Yield per Tonne (in ₹)		As per EC	Surplus /Short-fall	On Next Higher class i.e. Class 200	Surplus / Short-fall (as per higher Class)
145A	571115	720.85	82562.78	383344	532	1145	199	82562.78	0.00	83114.31	551.53

Note: Table adapted from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Class wise Base Freight Rate*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

D2: Petroleum & Gases class

(Class-170, Class-180, Class-190 & Class-200)											
Class	Class wise IR Traffic for the year 2022-23						Equivalent Class (EC)	Estimated Revenue (₹ in Cr.)			
	No. of wagons	Loading (MT)	Revenue (₹ in Cr.)	NTKM (million)	Avg Lead (KM)	Yield per Tonne (in ₹)		As per EC	Surplus / Short-fall	On Next Higher class i.e. Class 200	Surplus / Short-fall (as per higher Class)
170	0	0	0	0	0	0		0	0	0	0
190	0	0	0	0	0	0		0	0	0	0
180	121750	7.35	827.21	4106	558	1125	193	819.45	-7.76	920.13	92.92

Note: Table adapted from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Class wise Base Freight Rate*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

D3: Minerals & Ores Class

(Class-160, Class-165, Class-180)											
Class	Class wise IR Traffic for the year 2022-23						Equivalent Class (EC)	Estimated Revenue (₹ in Cr.)			
	No. of wagons	Loading (MT)	Revenue (₹ in Cr.)	NTKM (million)	Avg Lead (KM)	Yield per Tonne (in ₹)		As per EC	Surplus / Short-fall	OnNext Higher class i.e. Class 190	Surplus / Short-fall (as per higher Class)
160	151778	10.56	622.40	3020	286	589	185	1126.97	504.57	1156.50	534.10
165	2976169	205.68	21269.12	100949	491	1034	185	21952.93	683.81	22528.11	1258.99
180A(166)	874706	46.00	6098.66	29421	640	1326	185	4910.27	-1188.38	5038.92	-1059.73
Total	**4002653**	**262.24**	**27990.17**	**133390**	**509**	**1067**			**0.00**	**28723.53**	**733.36**

Note: Table adapted from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Class wise Base Freight Rate*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

D4: Building Material Class

(Class-140, Class-145, Class-150)											
Class	Class wise IR Traffic for the year 2022-23						Equivalent Class (EC)	Estimated Revenue (₹ in Cr.)			
	No. of wagons	Loading (MT)	Revenue (₹ in Cr.)	NTKM (million)	Avg Lead (KM)	Yield per Tonne (in ₹)		As per EC	Surplus / Short-fall	On Next Higher class i.e. Class 170	Surplus / Shortfall (as per higher Class)
140	227392	15.74	771.23	4269	271	489.94	166	1246.54	475.30	1278.06	506.82
145	526085	36.24	3341.90	19054	526	922.16	166	2869.76	-472.15	2942.32	-399.58
150	571115	36.75	2913.18	14905	406	792.74	166	2910.02	-3.16	2983.60	70.42
Total	**1324592**	**88.73**	**7026.32**	**38228**	**431**	**791.88**			**0.00**	**7203.98**	**177.66**

Note: Table adapted from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Class wise Base Freight Rate*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

D5: Foodgrains & Edibles Class

(Class-140A, Class-130A, Class-130 & Class-120)											
Class	Class wise IR Traffic for the year 2022-23						Equivalent Class (EC)	Estimated Revenue (₹ in Cr.)			
	No. of wagons	Loading (MT)	Revenue (₹ in Cr.)	NTKM (million)	Avg Lead (KM)	Yield per Tonne (in ₹)		As per EC	Surplus / Shortfall	On Next Higher class i.e. Class 140	Surplus / Shortfall (as per higher Class)
120	40839	2.49	536.82	3976	1596	2155.12	139	284.19	-252.63	286.06	-250.77
130	43770	2.69	541.64	3744	1392	2013.96	139	306.84	-234.80	308.85	-232.79
130A	1885409	119.08	17195.26	123184	1034	1444.00	139	13586.13	-3609.13	13675.21	-3520.05
140A	2175236	145.69	12525.52	79924.53	549	859.74	139	16622.07	4096.55	16731.06	4205.54
Total	**4145254**	**269.95**	**30799.24**	**210829**	**781**	**1140.92**			**0.00**	**30715.12**	**452.71**

Note: Table adapted from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Class wise Base Freight Rate*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

D6: Other Commodities

(Class-120A, Class-110 & Class-100)											
Class	Class wise IR Traffic for the year 2022-23						Equivalent Class (EC)	Estimated Revenue (₹ in Cr.)			
	No. of wagons	Loading (MT)	Revenue (₹ in Cr.)	NTKM (million)	Avg Lead (KM)	Yield per Tonne (in ₹)		As per EC	Surplus / Shortfall	On Next Higher class i.e. Class 110	Surplus / Shortfall (as per higher Class)
100	214179	13.67	1285.61	10390	760	940.69	108	1284.83	-0.78	1305.72	20.11
110	2990	0.19	33.64	275	1437	1756.96	108	18.00	-15.64	18.29	-15.35
120A	190755	12.78	1185.05	11580	906	927.27	108	1201.47	16.42	1221.00	35.95
Total	**407924**	**26.64**	**2504.30**	**22246**	**835**	**940.12**			**0.00**	**2545.01**	**40.71**

Note: Table adapted from Centre for Railway Information Systems (2023). Source: Centre for Railway Information Systems. (2023). *Class wise Base Freight Rate*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

D7: Social Sector Class

Financial Implication on merging of Class (Class 100A, Class-LR1, Class-LR2, Class-LR3 & Class-LR3A)											
Class	Class wise IR Traffic for the year 2022-23						Equivalent Class (EC)	Estimated Revenue (₹ in Cr.)			
	No. of wagons	Loading (MT)	Revenue (₹ in Cr.)	NTKM (million)	Avg Lead (KM)	Yield per Tonne (in ₹)		As per EC	Surplus / Shortfall	On Next Higher class i.e. Class 100A (92)	Surplus / Shortfall (as per higher Class)
LR1 (95)	16584	0.96	125.19	1253	1304	1302	84	128.54	3.35	132.06	6.86
100A (92)	138042	8.83	1245.55	12131	1373	1410	84	1181.28	-64.27	1213.58	-31.97
LR2 (76)	9989	0.61	73.58	920	1498	1199	84	82.06	8.48	84.30	10.72
LR3 (67)	40616	2.37	306.12	4046	1710	1294	84	316.33	10.21	324.98	18.86
LR3A (61)	21613	1.36	139.01	1963	1448	1026	84	181.25	42.24	186.21	47.19
Total	**226844**	**14.13**	**1889.45**	**20313**	**1438**	**1337**		**1889.45**	**0.00**	**1941.13**	**51.67**

Note: Table adapted from Centre for Railway Information Systems. (2023). Source: Centre for Railway Information Systems. (2023). *Financial Implication on Merging of Class*. Ministry of Railways. Retrieved from https://cris.org.in/loadpage?page=indexNew#home

APPENDIX E: Wagon-wise traffic carried

Wagon Type	Cement	Coal	Fertlizer	Foodgrain	Iron or Steel	Iron Ore	POL	RSMP	BOG
Covered	88.76	1.40	56.11	70.78	0.74	0.08	0.13	0.00	41.58
Open	57.44	510.31	0.56	0.15	36.21	119.35	0.00	25.96	42.28
Flat	0.00	0.00	0.00	0.00	28.47	0.00	0.00	0.00	5.54
Hopper	0.35	206.89	0.00	0.00	0.94	40.70	0.00	2.43	19.45
Tank	0.00	0.00	0.02	0.00	0.00	0.00	48.83	0.00	10.35

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

APPENDIX F: Calculation of wagons-based charging/ haulage rates

F1: Open Wagons

Class wise IR Traffic for the year 2022-23 Wagon based Charging (Open wagons)

Wagon Type	No. of wagons	PCC	Load-ing (MT)	% total	Revenue (₹ in Cr.)	NTKM (million)	Avg Lead (KM)	Yield per Tonne (in ₹)	Class 100 rate on avg lead	Freight per wagon at class 100 (in ₹)	Haulage Rate per Wagon (in ₹)	Equiv-alent Class (EC)
BOST	345369	65.0	21.77	3%	3426.76	18356	843	1573.81	868.50	56452.50	99220	176
BOSTHSM1	144	65.0	0.01	0%	1.20	7	767	1346.91	820.30	53319.50	83023	156
BOXN	**6459141**	**68.0**	**447.52**	**56%**	**53364.22**	**265848**	**594**	**1192.43**	**625.70**	42547.60	**82618**	194
BOXNEL	10951	67.0	0.77	0%	49.04	208	269	633.03	308.30	20656.10	44785	217
BOXNHL	**3747517**	**70.0**	**261.86**	**33%**	**35272.44**	**179675**	**686**	**1347.01**	**723.20**	50624.00	**94122**	186
BOXN-HL25T	640482	70.0	47.21	6%	3811.44	16938	359	807.33	404.00	28280.00	59509	210
BOXNL	3931	70.0	0.28	0%	33.04	148	535	1195.89	576.50	40355.00	84060	208
BOXNR	3771	69.0	0.26	0%	31.36	173	670	1212.72	723.20	49900.80	83151	167
BOXNS	51339	68.0	3.87	0%	469.15	2157	557	1212.31	625.70	42547.60	91383	215
BOY	629	69.0	0.05	0%	4.85	22	466	1009.85	526.80	36349.20	77161	212
BOYEL	114342	69.0	8.66	1%	726.66	3356	388	839.01	428.40	29559.60	63552	215
Total	**11377616**	**69.6**	**792.26**		**97190.16**	**486890**	**615**	**1226.74**	**674.60**	**46974.68**	**85422**	**182**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

F2: Hopper Wagons

Class wise IR Traffic for the year 2022-23Wagon based Charging (Hopper wagons)												
Wagon Type	**No. of wagons**	**PCC**	**Load-ing (MT)**	**% total**	**Revenue (₹ in Cr.)**	**NTKM (mil-lion)**	**Avg Lead (KM)**	**Yield per Tonne (in ₹)**	**Class 100 rate on avg lead (in ₹)**	**Freight per wagon at class 100 (in ₹)**	**Haulage Rate per Wagon (in ₹)**	**Equiv-alent Class (EC)**
BOBR	40606	64	2.58	1%	139.51	503	195	541.10	235.60	15078.40	34357.93	228
BOBRN	**3214975**	**65**	**205.51**	**76%**	**11574.27**	**39787**	**194**	**563.20**	**235.60**	**15314.00**	**36001.12**	**235**
BOBRNHSM1	**26033**	**65**	**1.65**	1%	**92.47**	**300**	**181**	**559.16**	**235.60**	15314.00	**35520.88**	232
BOBRNHSM2	1162	65	0.07	0%	4.52	17	226	615.80	283.50	18427.50	38906.56	211
BOBSN	165	60	0.00	0%	0.60	1	322	1828.90	355.90	21354.00	36578.00	171
BOBSNM1	**587873**	**60**	**40.55**	**15%**	**1400.76**	**5051**	**125**	**345.45**	**154.20**	**9252.00**	**23827.52**	**258**
BOBYN	317423	62	19.83	7%	990.81	4066	205	499.61	258.70	16039.40	31214.15	195
BOBYNHS	8666	65	0.56	0%	21.25	57	101	377.34	154.20	10023.00	24522.74	245
Total	**4196903**	**64.5**	**270.76**		**14224.19**	**49783**	**184**	**525.34**	**235.60**	**15199.70**	**33892.12**	**223**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

F3: Covered Wagons

Wagon based Charging (Covered wagons)												
Wagon Type	**Class wise IR Traffic for the year 2022-23**								**Class 100 rate on avg lead (in ₹)**	**Freight per wagon at class 100 (in ₹)**	**Haulage Rate per Wagon (in ₹)**	**Equiv-alent Class (EC)**
	No. of wagons	**PCC**	**Load-ing (MT)**	**% total**	**Revenue (₹ in Cr.)**	**NTKM (millio n)**	**Avg Lead (KM)**	**Yield per Tonne (in ₹)**				
BCCW	76878	68	5.15	2%	236.39	1604	311	458.85	355.90	24201.20	30,749	127
BCFC	5880	68	0.40	0%	29.71	189	471	740.11	501.60	34108.80	50,531	148
BCFCE	**2988**	**68**	**0.20**	0%	**17.66**	**122**	**626**	904.92	674.60	45872.80	59,108	129
BCFCM	28912	67.5	1.95	1%	111.41	755	386	570.09	428.40	28917.00	38,534	133
BCN	**3297359**	**63**	**210.07**	**81%**	**25115.66**	**179253**	**853**	**1195.60**	**916.40**	**57733.20**	**76,169**	**132**
BC-NAHSM1	2190	68	0.14	0%	20.39	138	1008	1493.52	1108.80	75398.40	93,116	123
BCNHL	**639940**	**70**	**41.43**	**16%**	**5009.64**	**34183**	**825**	**1209.26**	**968.50**	**67795.00**	**78,283**	**115**
Total	**4054147**	**63.9**	**259.33**		**30540.86**	**216244**	**834**	**1177.67**	**868.50**	**55504.74**	**76,194**	**137**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

F4: Flat Wagons

Class wise IR Traffic for the year 2022-23 Financial Implication on Uniformed charging in IR Flat wagon group												
Wagon Type	**No. of wagons**	**PCC**	**Load-ing (MT)**	**% total**	**Reve-nue (₹ in Cr.)**	**NTKM (millio n)**	**Avg Lead (KM)**	**Yield per Tonne (in ₹)**	**Class 100 rate on avg lead (in ₹)**	**Freight per wagon at class 100 (in ₹)**	**Haulage Rate per Wagon (in ₹)**	**Equiv-alent Class (EC)**
BFNS	5886	62	0.38	1%	89.55	469	1246	2378.93	1302.20	80736.40	1,52,142	188
BFNS22.9	2189	63	0.14	0%	21.39	112	817	1557.00	868.50	54715.50	97,710	179
BFNSM	17448	69	1.19	3%	247.70	1435	1208	2085.19	1302.20	89851.80	1,41,962	158
BFNSM1	11648	69	0.72	2%	107.81	609	847	1501.01	868.50	59926.50	92,554	154
BFNV	**53055**	**68.5**	**3.57**	**11%**	**301.15**	**1620**	**453**	**843.19**	**501.60**	**34359.60**	**56,761**	**165**
BFRF	63	44	0.00	0%	0.04	0	38	254.41	123.30	5425.20	5,902	109
BRH	577	62	0.04	0%	2.58	12	314	680.25	355.90	22065.80	44,788	203
BRHN	41	62	0.00	0%	0.26	1	391	983.58	428.40	26560.80	62,325	235
BRHNEHS	1347	68	0.09	0%	4.23	19	211	468.84	258.70	17591.60	31,386	178
BRN	**377767**	**66**	**24.24**	**71%**	**4513.43**	**23442**	**967**	**1862.22**	**1012.10**	**66798.60**	**1,19,477**	**179**
BRN22.9	1276	63	0.08	0%	7.34	37	472	935.57	501.60	31600.80	57,518	182
BRNAC	126	63	0.01	0%	1.04	5	824	1831.01	868.50	54715.50	82,395	151
BRNAP	562	63	0.04	0%	1.44	4	125	404.37	123.30	7767.90	25,667	330
BRNAS	21326	63	1.35	4%	289.48	1222	908	2151.29	964.30	60750.90	1,35,742	223
SHRN	33875	63	2.19	6%	453.06	2434	1114	2073.23	1205.70	75959.10	1,33,746	176
Total	**527186**	**64.5**	**34.01**		**6040.49**	**31420**	**924**	**1776.03**	**964.30**	**62211.43**	**1,14,580**	**184**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

F5: Tank Wagons

Financial Implication on Uniformed charging in IR Tank wagon group												
Wagon Type	**Class wise IR Traffic for the year 2022-23**								**Class 100 rate on avglead (in ₹)**	**Freight per wagon at class 100 (in ₹)**	**Haulage Rate per Wagon (in ₹)**	**Equiv-alent Class (EC)**
	No. of wagons	**PCC**	**Load-ing (MT)**	**% total**	**Reve-nue (₹ in Cr.)**	**NTKM (millio n)**	**Avg Lead (KM)**	**Yield per Tonne (in ₹)**				
BTALN	618	48.78	0.02	0%	1.43	6	318	721.26	355.90	17360.80	23,175	133
BTAP	**132109**	**59.45**	**7.90**	**13%**	**867.20**	**4352**	**551**	**1098.10**	**625.70**	37197.87	**65,643**	176
BTCS	9845	55.28	0.54	1%	46.84	289	533	864.79	576.50	31868.92	47,577	149
BTFLN	29851	57.08	1.65	3%	214.43	1034	628	1302.08	674.60	38506.17	71,834	187
BTPG	63044	36.34	2.37	4%	450.76	2286	965	1903.59	1012.10	36779.71	71,500	194
BTPN	888458	54.28	46.73	79%	6132.25	29757	637	1312.41	674.60	36617.29	69,021	188
Total	**1123925**	**52.7**	**59.20**		**7712.92**	**37725**	**637**	**1302.88**	**674.60**	**35532.17**	**68,625**	**193**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

APPENDIX G: Saving in revenue for different wagons by rounding off PCC to one place of decimal

All Type of Wagons	Tare weight (Tonnes)	LT	PCC over CC+8 routes		Difference tonnes	No. of wagons	Loading (MT)	Total Revenue (₹ in Cr.)	Additional Tonnage (MT)	Surplus revenue by actual PCC ₹ in Cr.)
			worked out	notified						
BOXN	22.48	1	68.12	68	0.12	6459141	447.52	53364.22	0.78	94.17
BOXNS	22.48	1	68.12	68	0.12	51339	3.87	469.15	0.01	0.83
BOXNR	21.2	1	69.4	69	0.4	3771	0.26	31.36	0.00	0.18
BOST	25.5	1	63.1	63	0.1	345369	21.77	3426.76	0.03	5.44
BOBSNM1	30	1	60.6	60	0.6	587873	40.55	1400.76	0.35	14.01
BOBYN	25.2	1	61.8	62	-0.2	317423	19.83	990.81	0.00	0.00
BOXNHL	20.6	1	70	70	0	3747517	261.86	35272.44	0.00	0.00
BOBR	26	1	64.6	64	0.6	40606	2.58	139.51	0.02	1.31
BOBRN	25.61	1	64.99	65	-0.01	3214975	205.51	11574.27	0.00	0.00
BRN	20.32	1	66.68	66	0.68	377767	24.24	4513.43	0.26	46.50
BCN	27.2	1	63.4	63	0.4	3297359	210.07	25115.66	1.32	159.46
BCNHL	20.8	0.5	70.3	70	0.3	639940	41.43	5009.64	0.19	21.47
BCCW	23	0.5	68.1	68	0.1	76878	5.15	236.39	0.01	0.35
									Total 2.97	**343.72**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

APPENDIX H: Wagon wise Loading and Additional Revenue by reducing Loading tolerance to 0.5 T

All Type of Wagons	No. of wagons	Loading (MT)	Total Revenue (₹ in Cr.)	Yield per Tonne (in₹)	Additional Tonnage (Million Tonnes)	Additional Revenue by reducing Tolerance to 0.5Tonnes (₹ in Cr.)
BOXN	6459141	447.52	53364.22	1,192.43	3.23	385.10
BOXNHL	3747517	261.86	35272.44	1,347.01	1.87	252.40
BCN	3297359	210.07	25115.66	1,195.60	1.65	197.12
BOBRN	3214975	205.51	11574.27	563.20	1.61	90.53
BOXNHL25T	640482	47.21	3811.44	807.33	0.32	25.85
BTPN	888458	46.73	6132.25	1,312.41	0.44	58.30
BCNHL	639940	41.43	5009.64	1,209.26	0.32	38.69
BOBSNM1	587873	40.55	1400.76	345.45	0.29	10.15
BRN	377767	24.24	4513.43	1,862.22	0.19	35.17
BOST	345369	21.77	3426.76	1,573.81	0.17	27.18
BOBYN	317423	19.83	990.81	499.61	0.16	7.93
BOYEL	114342	8.66	726.66	839.01	0.06	4.80
BTAP	132109	7.90	867.20	1,098.10	0.07	7.25
NMG	95823	5.63	579.37	1,028.24	0.05	4.93
BCCW	76878	5.15	236.39	458.85	0.04	1.76
BOXNS	51339	3.87	469.15	1,212.31	0.03	3.11
BFNV	53055	3.57	301.15	843.19	0.03	2.24
BOBR	40606	2.58	139.51	541.10	0.02	1.10
BTPG	63044	2.37	450.76	1,903.59	0.03	6.00

All Type of Wagons	No. of wag-ons	Loading (MT)	Total Revenue (₹ in Cr.)	Yield per Tonne (in₹)	Additional Tonnage (Million Tonnes)	Additional Revenue by reducing Tolerance to 0.5Tonnes (₹ in Cr.)
SHRN	33875	2.19	453.06	2,073.23	0.02	3.51
BCFCM	28912	1.95	111.41	570.09	0.01	0.82
BOBRNHSM1	26033	1.65	92.47	559.16	0.01	0.73
BTFLN	29851	1.65	214.43	1,302.08	0.01	1.94
BRNAS	21326	1.35	289.48	2,151.29	0.01	2.29
BFNSM	17448	1.19	247.70	2,085.19	0.01	1.82
BOXNEL	10951	0.77	49.04	633.03	0.01	0.35
BFNSM1	11648	0.72	107.81	1,501.01	0.01	0.87
BCACBM	71781	0.62	410.25	6,576.02	0.04	23.60
BOBYNHS	8666	0.56	21.25	377.34	0.00	0.16
BTCS	9845	0.54	46.84	864.79	0.00	0.43
BCFC	5880	0.40	29.71	740.11	0.00	0.22
Other	42856	2.48	362.40	1,463.93	0.02	3.14
Total		**1422.52**	**156817.719**		**10.73**	**1199.51**

Note: Table adapted from Indian Railways (2023). Source: Indian Railways. (2023). *Indian Railways Revenue Statistics, 2023*. Ministry of Railways. Retrieved from https://indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/2023/7A-Rev_Mar_23.pdf

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