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A Critique of the Initiative for Public Private Partnership in Passenger Train Operations

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Abstract

In this paper, we critique the initiative for public private partnership in passenger train operations, started by the Ministry of Railways in July 2020. First, we examine each of the clusters in terms of parameters having implications on market and design coherence. The parameters include category of service (based on running time), train kms per week, train hours per week and average speed. Second, we present the salient features of bid parameters and conditions as per the documents released by the Ministry of Railways. Third, we assess the public private partnership initiative and bid conditions on parameters such as drivers for the initiative, market coherence, design coherence, bidding process and timeline, bid criteria, concession period, issues of competition, financial capacity, entry costs, train set features, fare and ticketing, terminals, schedule and stoppages, haulage and other charges and operations & maintenance. We also draw lessons from our understanding of the public private partnership experience of container train operators, where applicable. Finally, we suggest a way forward for the stakeholders in this public private partnership initiative.

Keywords: Public Private Partnership, Railways, Passenger Train Service, Regulation, Infrastructure

1. Introduction

Private sector participation in provisioning of passenger train services has gained significance in the past two decades in many countries across the world. However, the inherent monopolistic nature of rail infrastructure and strong incentives for vertical integration due to economies of scope make this provisioning challenging compared to other transport sectors (Gangwar and Raghuram, 2015; Gomez-Ibanez, 2009; Laurino, et al., 2015). Based on the drivers for competition, the various approaches include partial/full vertical and/or horizontal separation, or access to infrastructure within a vertically integrated railway. The need for an independent regulator becomes critical in all the approaches to protect the interests of all stakeholders (OECD, 2005, ECMT, 2005).

Background

As part of a slew of ongoing reforms, the Ministry of Railways (MoR), Government of India, is opening up passenger train operations to the private sector in the public private partnership (PPP) mode. With this in view, the MoR has invited Request for Qualifications (RFQs) from private train operators (PTOs) for operation of a set of passenger trains. Each RFQ is supported by a Project Information Memorandum (PIM).

The MoR has identified around 150 routes as of now for operations by the private sector. A route is a set of to **and** fro unique origin destination services. The number of routes has been revised in the corrigendum[1] released on September 18th, 2020, as compared to the RFQs[2]released in July 2020 which had 109 routes. In terms of to **or** fro services, while the July 2020 offer had 224 services, the September offer has 304 services.

These services have been grouped into 12 clusters (also referred to as projects) such that each cluster requires operation of a minimum of 12 train sets (also referred to as rakes). The MoR has invited 12 RFQs, one for each cluster. The clusters are Mumbai-1, Mumbai-2, Delhi-1, Delhi-2, Chandigarh, Howrah, Patna, Prayagraj, Secunderabad, Jaipur, Chennai and Bengaluru. A key benefit to the Indian Railways (IR) would be the additionality of investment to the tune of over Rs 30,000 crore (cr).

Documents

The MoR has made available a set of documents for the bidders, which are also accessible in the public domain. These include:

 i. Project Information Memorandum released on July 1st 2020
 ii. Request for Qualification released on July 1st 2020
 iii. Corrigendum No. 1 dated July 14th 2020
 iv. Corrigendum No. 2 dated July 31st 2020
 v. Reply to queries of the first pre-application conference on July 31st 2020

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[1] Corrigendum No. 5 (Dated 18.09.2020) Request for Qualification (RFQ) and Project Information Memorandum (PIM) for Passenger Train Operation
[2] Request for Qualification Documents (No. 2020/Trans.Cell/Elect./Train/I-XII) for Passenger Train Operations Clusters 1-12

    vi.   Data on passenger traffic on various routes for the calendar year 2019 issued with reply to queries for the first pre-application conference on July 31st 2020

    vii.   Schedule of Functional and Technical Requirements for Private Train Operation in IR dated August 2020

    viii.   Corrigendum No. 3 dated August 10th 2020

    ix.   Draft Feasibility Report issued with corrigendum 3 on August 10th 2020

    x.   Draft Concession Agreement issued with corrigendum 3 on August 10th 2020

    xi.   Corrigendum No. 4 dated August 21st 2020

    xii.   Corrigendum No. 5 dated September 18th 2020

    xiii.   Data on passenger traffic on various routes for the calendar years 2015-2019 issued with corrigendum 5

    xiv.   Corrigendum No. 6 dated September 21st 2020

The Draft Feasibility Report (DFR)[3] has been prepared by RITES Ltd and Deloitte Touche Tohmatsu India LLP. This paper is based on data available in the above documents.

Drivers for the Initiative

We see three drivers for this specific initiative, as stated by the MoR[4].

Demand exceeds capacity: There were 59 cr reserved passengers travelling by IR during 2018-19. However, there were a further 8.85 cr (15%) waitlisted passengers who could not be accommodated. On certain routes of the proposed initiative, the demand exceeded the train capacity by 30%[5].

Benefits to the passenger: The MoR envisages that this initiative will provide higher service quality and reduce journey times by the introduction of next generation coach technology.

Availability of track capacity due to Dedicated Freight Corridors (DFC): Presently, IR operates both passenger and freight trains on a common track. Major routes are saturated. However, two DFCs (Mumbai area to Delhi area and Howrah area to Ludhiana via Delhi area) are planned to be commissioned in 2021. This will generate additional capacity on routes adjacent to the DFCs, where more passenger trains can be run.

2. Analysis of Clusters

In this section, we examine each of the clusters in terms of parameters having implications on market and design coherence. The parameters include category of service (based on running time), train kms per week, train hours per week and average speed.

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[3] Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020
[4] Project Information Memorandum for No. 2020/Trans.Cell/Elect./Train/I for PPP in Passenger Train Operations in Cluster-1 (Mumbai-1)
[5] Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Overall Analysis of Clusters - September 2020

This initiative of MoR for PPPs in passenger train operations includes 304 services categorized into 12 clusters. We present an overall analysis in exhibit 1. The number of services varies across clusters from 12 (Delhi-2) to 40 (Patna).

In terms of distance, the total train kms per week on offer is 11,49,570, varying from 78,498 (Delhi-1) to 1,22,654 (Bengaluru). The average distance per service across all clusters is 914 kms, varying from 701 kms (Delhi-1) to 1405 kms (Bengaluru). While this reflects on the varying profile across clusters, there is also variance across services within a cluster. The minimum range across services within a cluster is 945 kms (Delhi-1), while the maximum range is 3,322 kms (Chennai).

In terms of time, this initiative renders a total travel time of 18,310:55 train hrs per week, varying from 1,249:30 (Delhi-1) to 2,008:15 (Bengaluru). The average running time per service across all clusters is 14:47 hrs, varying from 11:09 hrs (Delhi-1) to 24:05 hrs (Bengaluru). While this reflects on the varying profile across clusters, there is also variance across services within a cluster. The minimum range across services within a cluster is 17:25 hrs (Mumbai-1) to 63:40 hrs (Chennai).

The average speed across all services is 62.8 kmph, varying from 58.5 kmph (Secunderabad) to 68.4 kmph (Mumbai-2). While this reflects on the varying profile across clusters, there is also variance across services within a cluster. The minimum range across services within a cluster is 21.3 kmph (Jaipur) to 60.6 kmph (Prayagraj).

Overall Analysis of Clusters - July 2020

We also analyze similar parameters for the 224 services across the 12 clusters as per RFQ July 2020. The overall analysis in presented in exhibit 2.

The number of services varied across clusters from 10 (Bengaluru) to 26 (Prayagraj). The indicative project cost varied from Rs 2329 cr (many) to Rs 3221 cr (Chennai).

In terms of distance, the total train kms per week on offer was 10,67,106, varying from 75,460 (Delhi-1) to 1,17,842 (Chennai). The average distance per service across all clusters was 1,102 kms, varying from 770 kms (Delhi-1) to 2,204 kms (Bengaluru). The minimum range across services within a cluster was 889 kms (Delhi-1), while the maximum range was 3,244 kms (Prayagraj).

In terms of time, this initiative rendered a total travel time of 16,798:35 train hrs per week, varying from 1,268:40 (Howrah) to 1,857:15 (Chennai). The average running time per service across all clusters was 18:02 hrs, varying from 12:13 hrs (Delhi-1) to 36:50 hrs (Bengaluru). The minimum range across services within a cluster was 16:40 hrs (Delhi-1) to 63:15 hrs (Prayagraj).

The average speed across all services was 63.5 kmph, varying from 59.1 kmph (Secunderabad) to 70.2 kmph (Mumbai-2). The minimum range across services within a cluster was 20.6 kmph (Bengaluru) to 60.3 kmph (Prayagraj).

The MoR was expecting deployment of 151 rakes to serve the 12 clusters. The minimum per cluster was 12 (many), while the maximum was 16 (Chennai). The average rake utilization across all clusters was 1010 kms per day. This varied from 898 kms per day (Delhi-1) to 1122 kms per day (Mumbai-1).

Changes in the Cluster Profile - September 2020 vs July 2020

We also analyze the changes in the cluster profile of September 2020 versus that of July 2020. This analysis is presented in exhibit 3. The maximum number of services have been increased in the Patna cluster (from 20 to 40), followed by Howrah (from 22 to 36) and Prayagraj (from 26 to 38).

In terms of distance, the train kms per week increased by 82,761 kms, an increase of nearly 8%. Patna, Howrah and Bengaluru clusters were the top three, in that order, for increase of train kms per week. The average distance per service reduced by 188 kms, a reduction of 17%. This reduction has happened since most of the additional services are short haul services. The maximum reduction is in the Bengaluru cluster, the average reducing from 2204 kms to 1405 kms, a reduction of 799 kms, which is 36%. This is followed by Patna with the reduction in the average of 451 kms, which is 29%. This is followed by Prayagraj with a reduction in the average of 350 kms, which is 24%.

In terms of time, the train hours per week increased by 1512:20 hrs, an increase of 9%. Patna, Howrah and Bengaluru were the top three, in that order, for increase of train hours per week. The average running time per service reduced by 3:15 hrs, a reduction of 18%. This reduction has happened since most of the additional services are short haul services. The maximum reduction is in the Bengaluru cluster, the average reducing from 36:50 hrs to 24:05 hrs, a reduction of 12:44 hrs, which is 34%. This is followed by Patna with the reduction in the average of 8:02 hrs, which is 30%.

The average speed across all services marginally decreased from 63.5 kmph to 62.8 kmph.

Cluster-wise Analysis

We present cluster-wise analysis for each of the 12 clusters in the annexure. There are two tables for each cluster, one examining all the services within each cluster and the second providing the expected maintenance facility locations. This results in 24 tables.

Columns 1-10 of the cluster analysis table present descriptive information of each service as given in the RFQ document of the respective cluster and as revised in Corrigendum 5. Columns 11-14 are based on the authors' analysis.

We believe that it is important to understand the nature of each service to relate it to the market segment that it can attract. We categorize the services as:

- Day: Used when train starts in the morning/afternoon hours and reaches the destination on the same day.
- Overnight: Used when train starts in the evening hours and reaches the destination in the morning hours of the next day.

- Overnight+MD (Marginal Day): Used when the journey includes overnight travel and a marginal part of the day of departure or the day of arrival, such that a substantial part of the day is available to the traveler outside of the travel.
- Overnight+SD (Substantial Day): Used when the journey includes overnight travel and a substantial part of the day of departure or the day of arrival, such that only a marginal part of the day is available to the traveler outside of the travel.
- Two Night: Used when the journey spans two or more nights.

Column 11 indicates the 'Category of Service' from the standpoint of market segmentation. The above nomenclature is used in this column.

Column 12 has 'Train kms per week' which is the product of distance and frequency per week.

Column 13 has the 'Train hours per week' which is calculated by taking the product of running time and frequency per week.

Column 14 has the 'Average Speed' which is the quotient of distance divided by running time.

The following section presents the above analysis, based on tables 1 through 24 given in the annexure.

Mumbai-1: As per table 1, as in September 2020, Mumbai-1 cluster has 16 services with a total of 102,156 train kms per week on offer. The average distance per service is 1,000 kms, varying from 497 kms to 1943 kms. The total train hrs per week on offer is 1,594:45. The average running time per service is 15:52 hrs, varying from 8:25 hrs to 25:50 hrs. The average speed across all services is 64.06 kmph, varying from 49.60 kmph to 79.21 kmph.

In this cluster, the average distance per service has reduced from 1,006 kms to 1000 kms.

As seen in table 2, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 1122 kms per day. The washing points would be located in Kalburgi and Mumbai. The washing point at Kalburgi would tend to 3 rakes while the one at Mumbai would tend to 9 rakes. The primary maintenance depot was expected to be located at Mumbai.

Out of the 16 services, there are 3 'Day', 3 'Overnight', 1 'Overnight+MD' and 9 'Overnight+SD' services. There are three non-symmetrical services (Lokmanya Tilak (T)-Kalburgi, Lokmanya Tilak (T)-Ajni and Lokmanya Tilak (T)-Madgaon) where one way is a 'Day' trip while the other is an 'Overnight' trip.

Mumbai-2: As per table 3, as in September 2020, Mumbai-2 cluster has 30 services with a total of 96,042 train kms per week on offer. The average distance per service is 793 kms, varying from 263 kms to 1,679 kms. The total train hrs per week on offer is 1,404:00. The average running time per service is 12:34 hrs, varying from 3:00 hrs to 28:25 hrs. The average speed across all services is 68.41 kmph, varying from 42.38 kmph to 92.27 kmph.

In this cluster, the average distance per service has reduced from 884 kms to 793 kms.

As seen in table 4, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 1066 kms per day. The washing points would be located in Mumbai, Indore and Surat. The washing point at Mumbai would tend to 6 rakes, the one at Indore would tend to 2 rakes while the one at Surat would tend to 4 rakes. The Primary Maintenance Depot was expected to be located at Mumbai.

Out of the 30 services, there are 10 'Day', 8 'Overnight', 6 'Overnight+MD' and 6 'Overnight+SD' services. There are four non-symmetrical services (Dadar-Ahmedabad, Mumbai (Vasai Road)-Shirdi, Indore-Chittorgarh (2 services)) where one way is a 'Day' trip while the other is an 'Overnight' trip. The services to Akola and Shirdi are better served from the Mumbai-1 cluster terminals, since the leads from Mumbai-2 cluster are more.

Delhi-1: As per table 5, as in September 2020, Delhi-1 cluster has 16 services with a total of 78,498 train kms per week on offer. The average distance per service is 701 kms, varying from 217 kms to 1,162 kms. The total train hrs per week on offer is 1,249:30. The average running time per service is 11:09 hrs, varying from 3:45 hrs to 21:50 hrs. The average speed across all services is 62.82 kmph, varying from 52.84 kmph to 80.46 kmph.

In this cluster, the average distance per service has reduced from 770 kms to 701 kms.

As seen in table 6, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 898 kms per day. The washing points would be located in Delhi area, Lucknow and Sabarmati. The washing point at Delhi area would tend to 10 rakes while the ones at Lucknow and Sabarmati would tend to 1 rake each. The Primary Maintenance Depots was expected to be located in Delhi area.

Out of the 16 services, there are 7 'Day', 2 'Overnight', 5 'Overnight+MD' and 2 'Overnight+SD' trips. There is one non-symmetrical service (Indore-Nizamuddin) where one way is a 'Day' trip while the other is an 'Overnight' trip. There is one service (Indore-Bhopal) which is operated in a region geographically away from the cluster headquarters.

Delhi-2: As per table 7, as in September 2020, Delhi-2 cluster has 12 services with a total of 86,366 train kms per week on offer. The average distance per service is 1028 kms, varying from 281 kms to 1,915 kms. The total train hrs per week on offer is 1,351:00. The average running time per service is 16:05 hrs, varying from 4:40 hrs to 27:00 hrs. The average speed across all services is 63.93 kmph, varying from 44.96 kmph to 78.72 kmph.

In this cluster, the average distance per service has remained constant at 1,028 kms.

As seen in table 8, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 1028 kms per day. The washing points would be located in Delhi area, Pune, Guwahati and Kathgodam. The washing point at Delhi would tend to 5 rakes, the one at Pune would tend to 2 rakes while the ones at Guwahati and Kathgodam would tend to 4 and 1 rakes, respectively. The Primary Maintenance Depot was expected to be located in Delhi area.

Out of the 12 services, there are 1 'Day', 4 'Overnight', 1 'Overnight+MD' and 6 'Overnight+SD' services. There is one non-symmetrical service (Kathgodam-Delhi) where one way is a 'Day' trip while the other is an 'Overnight' trip.

Chandigarh: As per table 9, as in September 2020, Chandigarh cluster has 22 services with a total of 93,662 train kms per week on offer. The average distance per service is 778 kms, varying from 266 kms to 1,352 kms. The total train hrs per week on offer is 1,495:50. The average running time per service is 12:32 hrs, varying from 3:00 hrs to 22:00 hrs. The average speed across all services is 62.62 kmph, varying from 51.53 kmph to 88.67 kmph.

In this cluster, the average distance per service has reduced from 809 kms to 778 kms.

As seen in table 10, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 1034 kms per day. The washing points would be located in Amritsar area, Bhopal, Chandigarh, Delhi, Lucknow and Varanasi. The washing point at Amritsar area would tend to 2 rakes, the one at Bhopal would tend to 3 rakes, the one at Chandigarh would tend to 2 rakes, the one at Delhi would tend to 1 rake while the ones at Lucknow and Varanasi would tend to 2 rakes each. The Primary Maintenance Depot was expected to be located in Chandigarh area.

Out of the 22 services, there are 11 'Day', 2 'Overnight', 1 'Overnight+MD' and 8 'Overnight+SD' services. There is one non-symmetrical service (Bhopal (Sant Hirda)-Ajmer) where one way is a 'Day' trip while the other is an 'Overnight' trip. There are three services which are operated in regions geographically away from the cluster headquarters (Jabalpur-Bandra (T), Habibganj-Pune (Hadapsar) and Bhopal (Sant Hirda)-Ajmer).

Howrah: As per table 11, as in September 2020, Howrah cluster has 36 services with a total of 101,036 train kms per week on offer. The average distance per service is 815 kms, varying from 310 kms to 2,020 kms. The total train hrs per week on offer is 1,528:25. The average running time per service is 12:40 hrs, varying from 4:25 hrs to 28:30 hrs. The average speed across all services is 66.11 kmph, varying from 51.86 kmph to 88.02 kmph.

In this cluster, the average distance per service has reduced from 923 kms to 815 kms.

As seen in table 12, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 1032 kms per day. The washing points would be located in Howrah, Ranchi, Puri, New Bongaigaon, Sealdah and Bhagalpur. The washing point at Howrah would tend to 7 rakes while the ones at other locations would tend to 1 rake each. The Primary Maintenance Depot was expected to be located at Howrah.

Out of the 36 services, there are 17 'Day', 7 'Overnight', 3 'Overnight+MD' and 9 'Overnight+SD' services. There are five non-symmetrical services (Howrah-Puri, Howrah-Bokaro, Puri-Shalimar, Howrah-New Bongaigaon and Sealdah-Patna) where one way is a 'Day' trip while the other is an 'Overnight' trip.

Patna: As per table 13, as in September 2020, Patna cluster has 40 services with a total of 94,888 train kms per week on offer. The average distance per service is 1,122 kms, varying from 230 kms to 2,434 kms. The total train hrs per week on offer is 1,546:25. The average running time per service is 18:55 hrs, varying from 4:10 hrs to 45:05 hrs. The average speed across all services is 61.36 kmph, varying from 42.43 kmph to 93.45 kmph.

A significant change in the cluster profile is that most of the additional services are short haul, reducing the average distance per service from 1,573 kms to 1,122 kms.

As seen in table 14, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 938 kms per day. The washing points would be located in Patna, Asansol, Gaya and Darbhanga. The washing point at Patna would tend to 9 rakes while the ones at other locations would tend to 1 rake each. The Primary Maintenance Depot was expected to be located at Patna.

Out of the 40 services, there are 13 'Day', 10 'Overnight', 1 'Overnight+MD', 6 'Overnight+SD' and 10 'Two Night' services. There are nine non-symmetrical services (New Delhi-Patna, Gaya-Anand Vihar (2 services), Patna-Lucknow Jn., Darbhanga-New Jalpaiguri, Patliputra-Lucknow Jn., Patliputra-Gorakhpur, Patna-Tatanagar and Asansol-Puri) where one way is a 'Day' trip while the other is an 'Overnight' trip.

Prayagraj: As per table 15, as in September 2020, Prayagraj cluster has 38 services with a total of 89,786 train kms per week on offer. The average distance per service is 1,102 kms, varying from 200 kms to 3,449 kms. The total train hrs per week on offer is 1,507:35. The average running time per service is 19:39 hrs, varying from 3:45 hrs to 66:50 hrs. The average speed across all services is 59.56 kmph, varying from 40.96 kmph to 101.54 kmph.

A significant change in the cluster profile is that most of the additional services are short haul, reducing the average distance per service from 1,453 kms to 1,102 kms.

As seen in table 16, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 978 kms per day. The washing points would be located in Prayagraj area, Pune, Gorakhpur, Bhopal, Kanpur, Manduadih and Jhansi. The washing point at Prayagraj area would tend to 4 rakes, the ones at Gorakhpur and Manduadih would tend to 2 rakes each while the others would tend to 1 rake each. The Primary Maintenance Depot was expected to be located in Prayagraj area.

Out of the 38 services, there are 13 'Day', 3 'Overnight', 3 'Overnight+MD', 12 'Overnight+SD', and 7 'Two Night' services. There are three non-symmetrical services (Prayagraj (Subedarganj)-Gorakhpur, Prayagraj (Subedarganj)-Agra Fort and Agartala-Karimganj) where one way is a 'Day' while the other is an 'Overnight' trip. There are five services (Pune-Dibrugarh, Pune-Kalburgi, Agartala-Habibganj, Agartala-Karimganj and Habibganj (SHRN)-Rajkot) which are operated in regions geographically away from the cluster headquarters.

Secunderabad: As per table 17, as in September 2020, Secunderabad cluster has 24 services with a total of 79,824 train kms per week on offer. The average distance per service is 882 kms, varying from 304 kms to 2,005 kms. The total train hrs per week on offer is 1,364:20. The average running time per

service is 15:09 hrs, varying from 4:50 hrs to 35:15 hrs. The average speed across all services is 58.51 kmph, varying from 48.37 kmph to 72.00 kmph.

In this cluster, the average distance per service has increased from 828 kms to 882 kms.

As seen in table 18, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 919 kms per day. The washing points would be located in Secunderabad area, Visakhapatnam, Tirupati and Guntur. The washing point at Secunderabad would tend to 6 rakes, the one at Visakhapatnam would tend to 2 rakes, the one at Tirupati would tend to 1 rake, while the one at Guntur would tend to 3 rakes. The Primary Maintenance Depot was expected to be located in Secunderabad area.

Out of the 24 services, there are 8 'Day', 6 'Overnight', 4 'Overnight+MD', 5 'Overnight+SD' and 1 'Two Night' services. There are two services (Lokmanya Tilak-Aurangabad and Bangalore (TCTB)-Sambalpur) which are operated in regions geographically away from the cluster headquarters.

Jaipur: As per table 19, as in September 2020, Jaipur cluster has 24 services with a total of 85,214 train kms per week on offer. The average distance per service is 915 kms, varying from 297 kms to 2,504 kms. The total train hrs per week on offer is 1,348:40. The average running time per service is 14:56 hrs, varying from 5:20 hrs to 20:10 hrs. The average speed across all services is 63.18 kmph, varying from 52.85 kmph to 74.18 kmph.

In this cluster, the average distance per service has reduced from 1,097 kms to 915 kms.

As seen in table 20, as per the July 2020 RFQ, the cluster was expected to have 12 rakes with a utilization of 973 kms per day. The washing points would be located in Jaipur area, Jodhpur, Ajmer and Kota. The washing points at Jaipur area and Jodhpur would tend to 4 rakes each, the one at Ajmer would tend to 3 rakes, while the one at Kota would tend to 1 rake. The Primary Maintenance Depot was expected to be located at Jaipur area.

Out of the 24 services, there are 12 'Day', 2 'Overnight', 6 'Overnight+MD' and 1 'Overnight+SD' and 3 'Two Night' services. There are two non-symmetrical services (Bangalore (TCTB)-Hubli, Jaipur-Jaisalmer) where one way is a 'Day' while the other is an 'Overnight' trip. There is one service (Bangalore (TCTB)-Hubli) which is operated in a region geographically away from the cluster headquarters.

Chennai: As per table 21, as in September 2020, Chennai cluster has 28 services with a total of 119,444 train kms per week on offer. The average distance per service is 885 kms, varying from 150 kms to 3,472 kms. The total train hrs per week on offer is 1,912:10. The average running time per service is 14:51 hrs, varying from 3:00 hrs to 66:40 hrs. The average speed across all services is 62.47 kmph, varying from 47.69 kmph to 80.89 kmph.

In this cluster, the average distance per service has reduced from 1,002 kms to 885 kms.

As seen in table 22, as per the July 2020 RFQ, the cluster was expected to have 16 rakes with a utilization of 1052 kms per day. The washing points would be located in Chennai, Kochuveli, Secunderabad, Coimbatore, Tiruchchirappalli and Madurai. The washing point at would tend to 8 rakes, the one at Kochuveli would tend to 3 rakes, the one at Secunderabad would tend to 2 rakes while the others would tend to 1 rake each. The Primary Maintenance Depot was expected to be located at Chennai. We expect the same pattern of washing points to continue.

Out of the 28 services, there are 14 'Day', 3 'Overnight', 5 'Overnight+MD' and 4 'Overnight+SD' and 2 'Two Night' services.

Bengaluru: As per table 23, as in September 2020, Bengaluru cluster has 18 services with a total of 122,654 train kms per week on offer. The average distance per service is 1,405 kms, varying from 250 kms to 3,364 kms. The total train hrs per week on offer is 1,998:15. The average running time per service is 24:55 hrs, varying from 3:30 hrs to 65:45 hrs. The average speed across all services is 61.38 kmph, varying from 42.50 kmph to 74.96 kmph.

A significant change in the cluster profile is that most of the additional services are short haul, reducing the average distance per service from 2,204 kms to 1,405 kms.

As seen in table 24, as per the July 2020 RFQ, the cluster was expected to have 15 rakes with a utilization of 1050 kms per day. The washing points would be located in Bengaluru, Bhubaneswar and Howrah. The washing point at Bengaluru would tend to 8 rakes, the one at Bhubaneswar would tend to 3 rakes while the one at Howrah would tend to 4 rakes. The Primary Maintenance Depot was expected to be located at Bengaluru. We expect the same pattern of washing points to continue.

Out of the 18 services, there are 6 'Day', 2 'Overnight', 5 'Overnight+SD' and 5 'Two Night' services. There are two non-symmetrical services (Bangalore (TCTB)-Hosapete and Hatia-Patna) where one way is a 'Day' while the other is an 'Overnight' trip. There are two services (Tatanagar-Hatia and Hatia-Patna) which are operated in regions geographically away from the cluster headquarters.

Common Issues: The above analysis brings out cluster-wise implications for market coherence and consequently design coherence. Clusters with high variance in category of service would potentially make it more difficult for the bidder. This would also be reflected in high variance in distance and running time of services. An added dimension of difficulty in nurturing a market and designing the rake interiors would be if the to and fro services between the same terminals were from a different category of service. Another dimension affecting market coherence is when services are operated in a region geographically away from the cluster headquarters, with no connect to the cluster region.

Turnaround times at terminals would be an important parameter for operational flexibility and punctuality. This could also be examined as a function of the travel times of the incoming service, the logic being that we would need more turnaround time after a long-haul service.

3. Salient Features of the Bid Parameters and Conditions

Bidding process and timeline: Private parties for each of the clusters will be selected through a two-stage competitive bidding process. These are the qualification and bid stages. In the qualification stage, the bidders will be pre-qualified and shortlisted based on their financial capacity. In the bid stage, the request for proposal will be issued to selected bidders. The award will be made based on the revenue share offered. MoR issued the RFQs on July 1st, 2020 and plans to sign the Concession Agreement by June 2021, if all goes as per schedule. Exhibit 4 has the schedule of the bidding process. As part of the bidding process, two pre-application conferences were organized during the qualification stage on July 21st and August 12th. The RFQ is due by October 7th, 2020 after which the shortlists would be announced within 45 days. The sale of bid documents would begin on November 27th. There would further be two pre-bid conferences during the bid stage. The bids are due on January 12th, 2021. The signing of the Concession Agreement is expected to happen in early March, within two months of the bid due date.

Exhibit 5 has a list of participants who have attended the first or the second pre-application meetings.
Bid criteria: The bid parameter is a 'share of gross revenue'. In principle, gross revenue would include revenues from the operation of the trains, provision of services, and/or any other activity related to the project including ancillary facilities. The gross revenue would exclude pass through charges like station user fee and taxes, and non-operating income, for example, from sale of assets and interest/dividend. The definition of gross revenue as per the Draft Concession Agreement (DCA)[6] (available as part of Corrigendum 3) is presented in exhibit 6. The final definition of gross revenue shall be detailed in the Concession Agreement[7].

Concession period: The concession period shall be of 35 years from the Appointed Date. This is the date on which financial closure is achieved or an earlier date that the MoR and PTOs may determine by mutual consent The committed aspect of the concession seems to be the train services defined by the origin and destination, and frequency of service, with supporting rolling stock and marginal flexibility in schedules and stoppages subject to an annual 'Train Operation Plan' review.

Issues of competition/level playing field with IR: There will be no restriction on the number of clusters that can be awarded to a single operator (as per Corrigendum 2). At an operational level, the PTOs shall have non-discriminatory access. Moreover, a similar scheduled train will not depart the originating station for the destination station on same OD route within 60 minutes of the scheduled departure of the PTO train. However, if the capacity utilization of the concessionaire's train is more than 80% in the previous three months, this restriction shall not apply. This exclusivity will apply for three years, as stated in the DFR.

Financial capacity: The RFQ document specifies a minimum net worth of 50% of the indicative project cost of a cluster at the close of the preceding financial year. In case of a consortium, the combined financial capacity of those members, who shall have an equity share of at least 26% each in the Special

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[6] Draft Concession Agreement for PPP in Passenger Trains, August 2020
[7] While the Draft Concession Agreement has been released, the final Concession Agreement will be made available as part of the bid documents.

Purpose Vehicle (SPV), should satisfy the above conditions of eligibility; provided that each such member shall, for a period of 1 year from the date of commercial operation of the project, hold equity share capital not less than:

I.   26% of the subscribed and paid up equity of the SPV; and
II. 5% of the estimated project cost specified in the Concession Agreement.

Entry costs: The primary entry costs for a PTO are the investment requirements in rolling stock and required maintenance facilities. This is expected to range from Rs 2329 to 3221 cr across the 12 clusters, as per the July RFQ. It could be higher, based on the September cluster profile. The investment for each cluster should be made in a manner that all the trains are operational by the 6th year of the concession. A bidder shall be required to pay a bid security of Rs. 12 cr at the Request for Proposal (RFP) stage. At a transactional level, the cost of RFQ is set at Rs. 2,36,000 while the cost for RFP is set at Rs 4,72,000, inclusive of taxes.

Train set features: The RFQ states that the train sets shall be designed to operate at a maximum service speed of 160 kmph. The train set must be fully air conditioned[8]. The maintenance requirements would be such that the period between successive schedules would a minimum of 31 days or 40,000 kms of travel, whichever is later.

Each train set will have a minimum length equal to 384 meter (buffer to buffer) and a maximum not exceeding the longest passenger train operating on the respective route[9]. The maximum length has been specified as 535.2 meters for most of the services. Some services have a lesser maximum length specified (401.4, and 423.7 meters). The concessionaire may decide the configuration of the trains based on demand.

The concessionaire can procure trains and locomotives through ownership or leasing from a source of its choice, provided such trains and locomotives are compatible with the specification and standards stipulated in the Concession Agreement.

Fare and ticketing: The PTO shall be free to set the ticket fare. In response to a query raised in the pre-application meeting held on July 21st, 2020, the MoR clarified that there is no upper limit on the ticket fare and the PTOs do not need any approvals for setting the fare. Moreover, the PTO would be allowed to sell tickets on its own website, if it is integrated with the IR passenger reservation system. As per the DFR, the PTOs will not be allowed to sell waitlisted or RAC tickets.

Terminals, schedule and stoppages: PTOs would be given access to IR stations including terminals, for which the charges are included in the haulage. The departure and arrival times at the origin and destination are specified as per the RFQ. The PIM states that the running time taken by a train shall be within plus or minus 10% of the fastest train of IR on that route. Regarding stoppages, while the location can be determined by the PTO, the number cannot exceed the number of existing stoppages

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[8] Schedule of Functional & Technical Requirements for Private Train Operation in IR, No. RDSO/CG/P-20001, Carriage Directorate, Research Design and Standards Organisation, Ministry of Railways
[9] Corrigendum No. 2 (Dated 31.07.2020) Request for Qualification (RFQ) For Passenger Train Operation in Cluster 1 (Mumbai 1) Tender Reference Number: 2020/Trans.Cell/Elect.Train/I.

of the fastest train of the IR. The September cluster profile provides the number of indicated number of stoppages for each service. The PTOs have to hold the schedule and stoppages for a year. Changes can be proposed through an annual 'Train Operation Plan' by the PTO. This would then be considered and approved by the IR, subject to not increasing the travel time by more than 15 minutes and modifying the time at origin and destination stations by +/- 30 minutes.

Haulage and other charges: The PTO will pay haulage charges to the IR. Haulage charges will include access to track, overhead equipment, station, terminal, signal & telecommunication, maintenance depot, and pilots and guard. The haulage charge will be a function of distance and the length of the train. A minimum haulage charge will be applicable for a 384 m length train and increase proportionately, thereafter. While IR will ensure provision of electric traction, charges for traction will be paid on actuals by the PTO[10]. IR could charge station user fees, as different from station access charges which are part of the haulage. All other costs towards customer related services will be borne by the PTO.

Operations and maintenance (O&M): O&M of the PTO trains shall be governed by the standards and specifications given in the Concession Agreement. IR will provide the loco pilot, assistant loco pilot and guard. The PTO shall be responsible for training of the crew for operating its rolling stock. The rest of the staff including onboard and, on the ground, will be that of the PTO.

The key performance indicators for PTOs have been specified in the DCA. These include punctuality, reliability, and upkeep of trains among others. In addition, the DCA also refers to how accidents will be addressed. The responsibility for punctuality and accidents could be with the IR or PTO and would need to be determined.

The maintenance of the trains shall be the responsibility of the PTO. The IR will provide a berth in the existing maintenance depot or space for a new maintenance depot in a nearby area on an 'as is where is' basis. As already stated, maintenance of the trains shall not be scheduled before 31 days or a travel of 40,000 kms of the previously scheduled maintenance, whichever is later. The IR shall provide washing lines in its existing coaching depots for washing of the trains at nominated terminals as per the schedule and stabling lines for placing of trains when idle.

4. Assessment of PPP Initiative and Bid Conditions

This section assesses the PPP initiative and bid conditions. Where relevant, we will also draw lessons from our understanding of the PPP experience with container train operators (CTOs) in container train operations[11].

Drivers for the initiative: In terms of demand exceeding capacity, while the national figure for the share of waitlisted to confirmed passengers was 15% during 2018-19, the aggregate picture across

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[10] Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

[11] Gangwar, R., Morris, S., Pandey, A., & Raghuram, G. (2012). Container movement by rail in India: a review of policy evolution. *Transport Policy*, *22*, 20-28.

Gangwar, R., & Raghuram, G. (2010). *Container train operators in India: problems and prospects.* W.P. No. 2010-09-01, Indian Institute of Management, Ahmedabad

204 services for which the 2019 January to December data was made available is that the same share is 6.2% The variance across clusters is from 2.3% (Chennai) to 14.2% (Patna). There Is also variance in the share across services within a cluster, as discussed in the above section. While the 2019 data is indicative, it may not inspire confidence that demand is readily available. However, PTOs can go after the demand through improved services. The DFR also provides data on road and air passengers along the routes of the various services. Again, a matter of caution would be that the higher share of waitlisted passengers typically occurs on long haul trains in the non-AC segment. The PTOs need to see how to provide to this segment. It would be a challenge to align the 'premier' concept of these trains with all AC coaches, positioning to the current non-AC segment, and pricing.

This initiative is well aligned with the potential benefits to passengers, specially through better incentives for service orientation and introduction of next generation coach technology. One of the positives here is the attempt by IR to up the rake utilization, which for the set of PTO projects is 1010 kms per day, as per the July 2020 cluster profile. This could go up as per the September 2020 cluster profile, since many of the additional services could be part of the planned rake links, without additionality of rakes. This can be contrasted with the national average rake utilization for broad gauge which is 533 kms per day during 2018-19 vs 1010 kms[12]. However, there are many fast-intercity trains which do nearly 1000 kms per day even now in IR. The Vande Bharat express from New Delhi to Varanasi does a round trip of 1538 kms per day, but for five days a week. The Vande Bharat express from New Delhi to Katra does a round trip of 1310 kms per day, but for six days a week. While driving the service profile for each cluster with the objective of increasing rake utilization leads to efficiency, it could lead to concerns of market incoherence and punctuality, affecting effectiveness.

On the issue of availability of track capacity due to DFC, an analysis of the routes in the clusters indicates that Mumbai-2, Delhi-1, Delhi-2, Chandigarh, Patna, Prayagraj and Jaipur clusters shall benefit the most by commissioning of the DFCs. However, Howrah cluster shall benefit only partially whereas Mumbai-1, Secunderabad, Chennai and Bengaluru clusters shall not benefit at all. It should also be noted that the current line capacity utilization exceeds 100% on most segments where the PTO services are being planned, including those which are not affected by the DFC. Some segments even exceed 150% line capacity utilization[13].

Market coherence: As mentioned in the beginning of this section (under 'Cluster-wise Analysis'), we have assigned a 'category of service' to each service in a cluster to do a market segmentation analysis. 'Day' could cater primarily to the 'business' segment while 'Two Night' could cater to a diametrically opposite 'economy-seeking' segment. The 'Overnight' category could address both the 'business' segment and the 'social' segment. The 'Overnight+MD (marginal day)' and 'Overnight+SD (substantial day) categories would serve segments which are increasingly 'social' and 'economy-seeking,' and decreasingly 'business'. These segments require very different efforts from the PTO in terms of reaching out to the market, pricing, rolling stock, staff deployment, and service levels. Inconsistency in market segments in a cluster would make it hard for the PTO to position their services and could increase the investment required.

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[12] Indian Railways Yearbook 2018-19
[13] Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Another level of incoherence can be seen where at least one of the services has different categories of service for a round trip: 'Day' on one way and 'Overnight' on the other. The service and staff requirements would be different legs of the same round trip. There are at least 33 to **and** 33 fro services which are 'Day' one way and 'Overnight' in the return.

Some of the clusters also have incoherence in spatial markets, where they are required to operate services in a region geographically away from the cluster headquarters, with no connect to the cluster region. There are at least 14 to **and** 14 fro services of this nature, and operationally better served by another cluster.

Design coherence: Contrasting categories of service within a cluster raise the issue of design coherence. The PTO has to face the decision of whether the same rake should be deployed for different services serving different market segments. This issue is sharper when in a round trip where one way is 'Day' and the other is 'Overnight.' This raises the challenge to the PTO of designing the interior of a train set to see how flexibility can be obtained. Of course, an interior design for sleeping for 'Overnight' services can also be used for sitting for a fresh set of passengers 'Day' services though it would not be optimal from a customer service perspective.

Bidding process and timeline: In comparison to earlier initiatives including the container train operations, the bidding process and bid document reflected well thought out planning and detailing. MoR released the PIM and RFQ on July 1st, 2020 outlining the key project information, technical and financial capability requirements, bid process and bid evaluation criteria. The MoR has been responsive to the bidders in extending the original due date for submission of application from September 8th, 2020 to October 7th, 2020. MoR also provided a comprehensive dataset for the calendar years 2015 - 2019 giving the number of waitlisted passengers, number of confirmed passengers, earnings from waitlisted and confirmed passengers for each month, train, class, embarking station, disembarking station on each service. The data can be analyzed by the potential bidders to estimate the current demand on each route. While initially, only one year data (2019) was provided, subsequently five years data was provided.

Two pre-application conferences were organized as per schedule on July 21st and August 12th, 2020, before the submission of applications, providing an opportunity to bidders to raise queries and/or seek clarification on any of the bid related aspects. Between the two meetings, there were 25 participants. 14 participants attended both the meetings. While some of these are potential bidders, there are a few others who are expected to bid, but did not participate. The first pre-application conference received 222 queries. 75 out of 222 queries were clarificatory in nature wherein the bidders were directed to refer to a particular section of PIM or RFQ. The second pre-application conference received 167 queries. Majority of the queries referred to a particular section of the PIM or the RFQ while the rest were general queries or follow up comments to responses received in the first pre-application conference.

The DCA and DFR were made available prior to the second pre-application conference. Two corrigenda (5 and 6) were released on September 18th and September 21st. The first one revised the set of services on offer for each cluster which made the total number of services go up from 224 to 304. Along with that, the various dates for the bid stage events have been advanced (Exhibit 4). The bid due date has

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been advanced from March 31st, 2021 to January 12th, 2021. This reflects a confidence that the MoR has gained in this process. If this was in response to the pre-application queries, it is welcome. On the other hand, such changes could affect the bidders' expectation of reliability and make the pre-bid analysis more challenging.

Bid criteria: While all clusters are considered to be financially viable by MoR, bidders have raised concerns about the financial viability in pre-application conference meetings and have requested to consider negative bids (subsidy by authority to concessionaire for unviable project) as well. Such bid criteria including negative bids have been implemented successfully in the case of roads, telecom and the UDAN RCS scheme[14]. Since IR has ruled out the possibility of any subsidy (response to query 161, second pre-application conference meeting), there is a distinct possibility of situations where there could be no bidders or a single bidder for some of the clusters.

Concession period: While the concession period of 35 years appears long for an 'operator' PPP, there is reasonable flexibility in schedules, stoppages, and train configuration. What appears fixed are the train services defining the origins and destinations, and frequency. It would be helpful if the Concession Agreement provided more flexibility for changes in service parameters like frequency of service, minimum length of the train, dropping a service or introducing a new service, significantly changing timings and stoppages, based on defined triggers.

Issues of competition/level playing field with IR: The RFQ allows bidders to submit bid for more than one cluster. Though it was originally envisaged to limit the numbers of clusters to three in the event of any bidder emerging as the highest bidder for more than three clusters, a corrigendum dated July 30th, 2020 removed this restriction. This implies that all 12 clusters can principally be awarded to a single bidder in the event of that bidder emerging as the highest bidder for all clusters. While bidders planning to submit multiple bids will benefit by this change, in the extreme case this could lead to entry of only one player. While there would still be competition with IR trains, capacity building for future PTO could be compromised.

In the current framework, the PTOs will be competing only with IR. Though there are measures taken such as non-discriminatory access to railway infrastructure, provision of land for maintenance facilities, and exclusive right for first three years by not introducing any new train within a two-hour window, PTOs would face a number of challenges to compete with IR.

The current pricing of passenger services by IR has the benefit of significant cross subsidy from surpluses in freight operations. As per IR's own statement in publicly available passenger tickets, no more than 60% of the costs of passenger services were recovered through the fare. To make this a viable business, the PTOs will be compelled to charge a fare which after revenue share covers all operating costs and render a surplus for reasonable return on investment. This would result in the fare structure for PTOs being higher than that of IR. PTOs would have to offer superior services and customer experiences to justify the value for money for end users. In the long-haul services, the PTOs will also have to deal with competition from airlines, both on service and pricing.

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[14] Ude Desh ka Aam Naagrik - Regional Connectivity Scheme is a regional airport development scheme of the Government of India.

The exclusivity provided to PTOs for two-hour window is only for introduction of new trains by IR, from the same origin to the same destination. It would not apply if the PTO's train has an occupancy of above 80% for three successive months and in any case not after three years. It is technically possible for IR to introduce a train from a neighboring origin and/or to a neighboring destination. Certain service parameters like running time, length of the train and number of stoppages are anchored with the fastest, longest and fewest of the existing IR service. It is not clear how these will apply to the PTO, should such parameters of IR trains change. It is also important to question why there should be such anchoring rather than allow market forces to operate, except on technical grounds (like platform/loop length).

In the case of container train operations, the new operators had to compete directly with CONCOR which had a large legacy asset base. They were also competing indirectly with IR for commodities which were moving in IR wagons but could be containerized. The level playing field between CONCOR and new operators was long debated during the policy making process and resulted in measures such as the first come first served basis for train dispatch and charges (license fee and haulage) to be applicable for CONCOR as well. Still, there were level playing field issues faced by new operators in competing with the incumbent (CONCOR), which had a leverage due to the existing infrastructure base (rolling stock, terminals) and proximity with IR. Further, due to better service and lower 'freight all kind' fare, when some of the rake load traffic started shifting from IR to the CTOs, the IR started changing the conditions of service and haulage cost structure for the CTOs.

Financial capacity: The financial capacity requirements would tend to bring in medium and large enterprises. This would be aligned with the capability and reputational requirements for a significant customer facing PPP.

Entry costs: In comparison to CTOs, for whom the entry the entry costs were estimated to be around Rs 200-250 cr (considering Rs 50 cr license fee, Rs 100 cr medium sized Inland Container Depot (ICD) and Rs 75 cr for five container rakes) for new entrants in 2006, the entry costs for PTOs are approximately three times higher on a time indexed basis. The higher entry costs would be justified on grounds of ensuring the entry of serious players. The entry costs may also not be a barrier for serious entrants, given that most of the investment is in rolling stock rather than fixed infrastructure. In the case of CTOs, a higher share of investment went for the fixed infrastructure, restricting their flexibility for business.

Train set features: Bidders are required to procure rolling stock capable of running at 160 km/hour. This is estimated to cost Rs 10 cr per coach. This would cost at least three times more than the rolling stock currently in use for Rajdhani/Shatabdi trains. The indigenously designed T 18 coaches cost Rs 6 crores.

The average speed as per the proposed time schedule is between 58.5 - 68.5 km/hour on all routes across clusters. Only 21 out 304 services have an average speed 80 kmph or more. This raises the issue of whether the investment is justified for the PTO trains' speed capability. MoR has clarified that the IR network is in the process of upgradation on selected routes to make them fit for 160 kmph speed. The network would undergo upgradation on a continual basis. As and when a route is upgraded, it

shall be available for operation at a higher speed. This would help in optimal utilization of the rolling stock.

There is a restriction on the minimum and the maximum length of the trains that would be operated by PTOs. The minimum length should be 384 m (about 16 LHB[15] coaches of 24.7 meters length buffer to buffer). The maximum length should not be more than the length of the longest train operated by IR on the route.

The minimum could be restrictive on demand grounds, if there are periods when the occupancy could warrant a lesser train length. Even if the Concession Agreement were to have a minimum haulage charge for the allotted line capacity, the PTO may like to reduce the length to save on operating costs.

Fare and ticketing: While PTOs are given flexibility to adapt dynamic pricing for fare, the issuing waitlist tickets is not permitted. This might affect the occupancy of trains. In a competitive market, the operators should be taking this call as is the case in the airlines sector. Since the PTOs have to integrate with the IR passenger reservation system, they could be subject to the limitations of this system. This might restrict the flexibility of PTOs in offering the value-added services such as preferential seating, pre booking of on demand services, etc. This would also make integrated search optimization capabilities with other modes for reservation more difficult.

Terminals, schedule and stoppages: PTOs would be given access to IR stations for which the charges are included in the haulage. This minimizes the risk of terminal access which was very significant in the case of CTO business. Though the terminal access may not be an issue, enhancing customer experience at stations might not be easy given that facilities such as waiting rooms and platforms will be common. Some of the services have what could be 'inconvenient' (middle of the night) arrival or departure times at the terminals, further affecting customer experience. Other potential bottlenecks could be time taken to fill up the water tanks and evacuation of train toilets at stations.

IR is not subject to maintaining the same 'Train Operation Plan' for a year like PTOs and therefore has the flexibility to change the profile of its services.

Haulage and other charges: The charges payable by PTOs to IR would be: (i) haulage (access to infrastructure such as track, terminals, signaling & associated maintenance, loco pilot and guards), (ii) cost of traction, and (iii) other support services such as maintenance, washing, etc.

In the case of the current initiative, considerable efforts have been made by MoR in providing clarity to bidders on applicable charges. The DFR with detailed explanations on important business aspects has also been made available to bidders for their perusal.

Haulage has been fixed at Rs 512 per running km prior to inviting the bids. Since the total train kilometers in each cluster is known, a fair estimation on haulage cost can be made for each cluster.

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[15] Linke Hofmann Busch is a rail coach manufacturer in Germany whose coach technology has been adopted by the IR.

Increase in haulage is linked to AICPI (IW)[16] index for which the rationale has been provided in the DFR. The other charge by IR would be the cost of traction which would be as per the actual energy consumption. As of now, the charges for other support services is not clear.

Making available the charging structure and charges in advance mitigates risks for the bidders. It is hoped that similar clarity will emerge for all charges.

Significant lessons can be drawn from the CTO experience. Charges that were levied on CTOs by IR included haulage, maintenance, and terminal access. These were identified but not computed prior to inviting applications. Post the entry of new operators, there were frequent changes in haulage charges (which accounted for 70-75% of operating costs) including banning of three commodities and differential pricing for another nine commodity groups. Surcharge of 2% on haulage was also introduced and several other charges, like for parking and stabling were increased substantially. In the absence of an independent regulator, all such decisions were taken by IR unilaterally. All this had created a difficult business environment for the CTO business.

Operations and maintenance (O&M): The arrangement that the loco pilot, assistant loco pilot and guard are provided by the IR, but trained by the PTO for their train sets would address operating risk. However, there are issues of performance.

The key performance indicators for PTOs have been specified in the DCA. These include punctuality, reliability, and upkeep of trains among others. While reliability and upkeep could be well within the control of PTOs, punctuality of trains will be a function of efficient working of both PTO and IR. As per the DCA, PTOs would have to ensure 95% guaranteed punctuality (train arrival at destination station not delayed by more than 15 minutes), failing which penalty charges will be levied.

The early arrival of train at destination station by more than 10 minutes is also considered as a loss of punctuality and will attract penalty from PTOs. Given that the signaling is under the control of IR and the clearances will be given by them, it is not clear how responsibility would be attributed for this.

Beyond rolling stock availability and fitness, the punctuality of the PTO trains to a large extent will be dependent on the infrastructure (access to tracks and stations) and other services provided by IR. There would also be an issue of punctuality where there are low turnaround times between services by design. The problem would get accentuated when there is a quick turnaround for a short-haul service after a long-haul service, since the customer segment for short-haul services would be more affected by punctuality. For example, the Howrah-Tatanagar short-haul service departs Howrah with a turnaround of 1:00 hour after the 34:15 hrs incoming long-haul service from Bengaluru.

As per the DCA, the damage charges are also higher for PTOs as compared to IR in case of reduction in punctuality. For example, if there is a 1% reduction in punctuality due to reason attributable to PTO, it shall pay damages to IR as indexed haulage charges for 200 km. If the same reduction in punctuality

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[16] All India Consumer Price Index for Industrial Workers

happens due to reasons attributable to IR, the damage payable to PTO will be indexed haulage charges for 50 km.

While the penalty applicable to each party responsible for the loss of punctuality has been specified, identifying reasons based on objective considerations might not be easy. It would be useful if there are service level agreements as part of the Concession Agreement on the IR's commitment. Such practice is followed internationally. A similar issue arises in the case of accidents, where attributability could be challenged. In the case of accidents, the Commissioner for Railway Safety could play a role, though it needs to go beyond being a recommendatory body. In the absence of an independent regulator, responsibility for both punctuality and accidents could become an issue.

Every cluster has a primary maintenance depot, managed by the PTO, at the nodal location. However, not all services originate or terminate at this location. This would put a restriction that rake links need to be managed in a manner that every rake can visit the maintenance depot. In some clusters, there are services that do not have the option of making a visit to the maintenance depot, even with combined rake links. For example, in the Bengaluru cluster, the rakes in the Mysuru- Bhubaneswar service do not have an opportunity of visiting the Bengaluru depot, except through an empty run from Mysuru.

Washing lines have been provided at locations in a manner that every rake would have an opportunity of being washed during turnaround times of the services,

5. Conclusions and Way Forward

The MoR has been slower than other infrastructure ministries in leveraging PPPs. Further, in terms of an overall approach to PPPs, it is important that services move into the private domain even before that hardware of infrastructure. This is easily seen in aviation, roads and shipping where airlines, road users and shipping lines have been in the private domain well before PPP was brought in for the hardware. In this context, the MoR had brought in CTOs in the PPP format from 2006. This had its share of issues, some of which have been presented in this paper. Subsequently, the MoR has brought in PPP schemes to attract Special Freight Train Operators and Private Freight Terminals. In the passenger train context, they attempted managing a few train services through their own subsidiary, the IRCTC[17], since 2019. After this experiment, the MoR has embarked on this initiative. It is important that the MoR make this initiative a success.

This paper draws significantly from documents which are not yet binding on the PPP process. For example, the DFR tries to examine the viability of this project, building on various likely conditions that the PTO would be subject to. So also, the DCA proposes various conditions. In a more fundamental way, the MoR has changed the services on offer for each cluster in September 2020, after announcing the first set in July 2020. While it is important to be flexible, there could be difficulty for bidders in assessing the offer. In any case, everything should be final before the bids are due.

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[17] Indian Railway Catering and Tourism Corporation

The process that the MoR has demonstrated so far has been one of openness and a sense of purpose, given that various documents have been put out in the public domain and focused meetings have been held with stakeholders. It is important to keep this approach going.

There are concerns with the design of each cluster of services. While there has been an attempt to provide supply side coherence for each cluster, it is important that the demand side coherence be examined more thoroughly. The question to be asked is whether the bidder has been enabled with reaching out to and nurturing viable market segments. As an example, should clusters have been designed with a set of services that address similar market segments or should services addressing different market segments be consciously bundled? So also, whether the cluster-wise services should be maximally geographically separated or should there be competition between clusters, at least on important routes? It is the consistency of following a principle which can make or break the success of the PPP.

From the MoR's own perspective, it would be important to examine if the services on offer are aligned with reforms being considered in the structure of passenger train operations including the 'hub and spoke' concept, and the 'zero-based' time table.

It is also useful to examine whether issues like permitting a negative revenue share or a viability gap funding would facilitate the process. This has seen success in other infrastructure sectors. In a competitive bidding environment, even if a viability gap funding is sought, the real question should be whether the viability gap funding would be lower than what would be a net outflow for the IR to provide the same services.

In the context of various operating parameters, given the complexity of railway operations, there is a limit to how many variables can be anticipated and to what extent. Building in measured flexibility in the Concession Agreement would be important, including change of the parameters of services based on triggers.

There would always be room for interpretation, which could result in conflicts needing resolution. Among many others, issues of punctuality, accidents and service levels are subject to this. The need for an independent regulator would be critical.

A structural problem that the MoR faces is that there is no separation between the policy maker, the operator and the regulator, leading to significant conflict of interest. To make PPPs a success, it is important that they move quickly in the direction of this separation. More critically, an independent regulator would be required to interpret, regulate and adjudicate on matters governing the PPP's performance and more basically, the ability to perform. This is one of the reasons why the CTOs have not seen as much success as was expected.

In absence of an economic regulator in the rail sector, the pricing by IR has been an area of concern for private participation. There have been issues of conflict of interest and monopoly pricing in the past. The two interfaces subject to economic regulation for PTOs would be between (i) IR and PTOs, and (ii) PTOs and end users. While the interface between PTOs and end users is not vulnerable to

monopoly pricing due to competition, the interface between IR and PTOs is and hence requires due diligence.

Finally, it is important that the IR team and leadership vested with the responsibility of this PPP initiative show an attitude of partnership and facilitation as the process evolves.

Afterall, this is an important beginning...

References

References 8-29 can be accessed on the website:
https://eprocure.gov.in/eprocure/app?page=FrontEndTendersByOrganisation&service=page by clicking on '12' corresponding to no.229 – Railway Board.

1. Gangwar, R., Morris, S., Pandey, A., Raghuram, G. (2012). Container movement by rail in India: a review of policy evolution. Transport Policy, 22, 20-28.

2. Gangwar, R., Raghuram, G. (2010). Container train operators in India: problems and prospects. W.P. No. 2010-09-01, Indian Institute of Management, Ahmedabad

3. Gangwar, R., Raghuram, G. (2015). Framework for Structuring Public Private Partnerships in Railways, Case Studies on Transport Policy, 3, 295-303.

4. Gomez-Ibanez, J.A., 2009, Regulating Infrastructure: Monopoly, Contracts and Discretion. Harvard University Press.

5. Laurino, A., Ramella, F., Beria, Paolo, 2015, The economic regulation of railway networks: A worldwide survey, Transportation Research Part A: Policy and Practice, Volume 77, July 2015, Pages 202-212

6. OECD, 2005, Structural Reform in the Rail Industry. Policy roundtables, December 2005.

7. ECMT, 2005, European Conference of Ministers of Transport, 2005. Railway Reform and Charges for the Use of Infrastructure.

8. Project Information Memorandum for No. 2020/Trans.Cell/Elect./Train/I for PPP in Passenger Train Operations in Cluster-1 (Mumbai-1)

9. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/I) for Passenger Train Operations Cluster 1 (Mumbai-1)

10. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/II) for Passenger Train Operations Cluster 2 (Mumbai-2)

11. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/III) for Passenger Train Operations Cluster 3 (Delhi-1)

12. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/IV) for Passenger Train Operations Cluster 4 (Delhi-2)

13. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/V) for Passenger Train Operations Cluster 5 (Chandigarh)

14. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/VI) for Passenger Train Operations Cluster 6 (Howrah)

15. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/VII) for Passenger Train Operations Cluster 7 (Patna)

16. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/VIII) for Passenger Train Operations Cluster 8 (Prayagraj)

17. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/IX) for Passenger Train Operations Cluster 9 (Secunderabad)

18. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/X) for Passenger Train Operations Cluster 10 (Jaipur)

19. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/XI) for Passenger Train Operations Cluster 11 (Chennai)

20. Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/XII) for Passenger Train Operations Cluster 12 (Bengaluru)

21. Corrigendum No. 1 (Dated 14.07.2020)

22. Corrigendum No. 2 (Dated 31.07.2020)

23. Corrigendum No. 3 (Dated 10.08.2020)

24. Corrigendum No. 4 (Dated 21.08.2020)

25. Corrigendum No. 5 (Dated 18.09.2020)

26. Corrigendum No. 6 (Dated 21.09.2020)

27. Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020
28. Draft Concession Agreement for PPP in Passenger Trains, August 2020
29. Schedule of Functional & Technical Requirements for Private Train Operation in IR, No. RDSO/CG/P-20001, Carriage Directorate, Research Design and Standards Organisation, Ministry of Railways
30. Indian Railways Yearbook 2018-19

List of Abbreviations

Abbreviation	Expansion
AC	Air Conditioned
cr	Crore
CTO	Container Train Operators
DCA	Draft Concession Agreement
DFC	Dedicated Freight Corridors
DFR	Draft Feasibility Report
ICD	Inland Container Depot
IR	Indian Railways
MoR	Ministry of Railways
Non-AC	Non-Air Conditioned
O&M	Operations and maintenance
OD	Origin Destination
Overnight+MD	Overnight + Marginal Day
Overnight+SD	Overnight + Substantial Day
PIM	Project Information Memorandum
PPP	Public Private Partnership
PTO	Private Train Operators
RFP	Request for Proposal
RFQ	Request for Qualification
SPV	Special Purpose Vehicle

Exhibit 1: Overall Analysis of Clusters - September 2020

1	2	3	4	5	6	7	8	9	10	11
Cluster	Location	No of Services	Train kms per week	Average Distance (kms)	Range (Distance) (kms)	Train hours per week	Average Running Time (hrs)	Range (Running Time) (hrs)	Cluster Average Speed	Range (Average Speed)
1	Mumbai-1	16	102156	1000	1446	1594:45	15:52	17:25	64.1	25.6
2	Mumbai-2	30	96042	793	1416	1404:00	12:34	25:25	68.4	49.9
3	Delhi-1	16	78498	701	945	1249:30	11:09	18:05	62.8	27.6
4	Delhi-2	12	86366	1028	1634	1351:00	16:05	22:20	63.9	33.8
5	Chandigarh	22	93662	778	1086	1495:50	12:32	19:00	62.6	37.1
6	Howrah	36	101036	815	1710	1528:25	12:40	24:05	66.1	36.2
7	Patna	40	94888	1122	2190	1546:25	18:55	40:05	61.4	24.0
8	Prayagraj	38	89786	1102	3249	1507:35	19:39	63:05	59.6	60.6
9	Secunderabad	24	79824	882	1701	1364:20	15:09	30:25	58.5	23.6
10	Jaipur	24	85511	915	2207	1308:20	16:06	38:50	65.4	21.3
11	Chennai	28	119444	885	3322	1901:10	15:16	63:40	62.8	33.2
12	Bengaluru	18	122654	1405	3114	1998:15	24:55	62:15	61.4	32.5
		304	**1149867**	**914**	**3322**	**18249:35**	**14:47**	**63:40**	**63.0**	**60.6**

Source:
Column 3-4: Corrigendum 5 (Dated 18.9.2020)
Column 4-11: As calculated in each cluster-wise analysis

Exhibit 2: Overall Analysis of Cluster - July 2020

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cluster	Location	No of OD Pairs	Indicative Capital Cost (Rs Cr)	Train kms per week	Average Distance	Range (Distance) (kms)	Train hours per week	Average Running Time (hrs)	Range (Running Time) (hrs)	Cluster Average Speed	Range (Average Speed)	Number of Rakes	Rake Utilization
1	Mumbai-1	16	2330	94264	1006	1446	1416:30	15:03	17:45	66.5	26.3	12	1122
2	Mumbai-2	24	2510	89514	884	1416	1274:40	13:47	25:50	70.2	45.5	12	1066
3	Delhi-1	14	2329	75460	770	889	1198:10	12:13	16:40	63.0	27.6	12	898
4	Delhi-2	12	2329	86366	1028	1634	1342:15	15:58	22:20	64.3	33.8	12	1028
5	Chandigarh	18	2510	86850	809	1086	1377:00	12:51	18:30	63.1	37.1	12	1034
6	Howrah	22	2510	86716	923	1595	1268:40	13:32	21:15	68.4	32.6	12	1032
7	Patna	20	2329	78788	1573	1838	1282:25	26:58	34:35	61.4	41.2	12	938
8	Prayagraj	26	2329	82144	1453	3244	1362:35	25:45	63:15	60.3	60.3	12	978
9	Secunderabad	20	2510	77182	828	1701	1306:20	13:58	30:30	59.1	23.1	12	919
10	Jaipur	18	2329	81698	1097	2130	1332:05	18:01	35:30	61.3	24.2	12	973
11	Chennai	24	3221	117842	1002	3162	1857:15	16:30	59:05	63.4	33.2	16	1052
12	Bengaluru	10	2863	110282	2204	1511	1780:40	36:50	32:15	61.9	20.6	15	1050
		224	**30099**	**1067106**	**1102**	**3244**	**16798:35**	**18:02**	**63:15**	**63.5**	**60.3**	**151**	**1010**

Source:
Column 3-4: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/I) for Passenger Train Operations,
Column 5-12: As calculated in each cluster-wise analysis,
Column 13: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020
Column 14: Authors' Analysis

Exhibit 3: Changes in the Cluster Profile - September 2020 vs July 2020

Cluster	Location	No of Services			Train kms per week			Average Distance (kms)			Train hours per week			Average Running Time (hrs)		
		September	July	Change	September	July	Change	September	July	Change	September	July	Change	September	July	Change
1	Mumbai-1	16	16	0	102156	94264	7892	1000	1006	-6	1594:45	1416:30	178:15	15:52	15:03	0:49
2	Mumbai-2	30	24	6	96042	89514	6528	793	884	-90	1404:00	1274:40	129:20	12:34	13:47	-1:13
3	Delhi-1	16	14	2	78498	75460	3038	701	770	-69	1249:30	1198:10	51:20	11:09	12:13	-1:04
4	Delhi-2	12	12	0	86366	86366	0	1028	1028	0	1351:00	1342:15	8:45	16:05	15:58	0:06
5	Chandigarh	22	18	4	93662	86850	6812	778	809	-31	1495:50	1377:00	118:50	12:32	12:51	-0:18
6	Howrah	36	22	14	101036	86716	14320	815	923	-108	1528:25	1268:40	259:45	12:40	13:32	-0:52
7	Patna	40	20	20	94888	78788	16100	1122	1573	-451	1546:25	1282:25	264:00	18:55	26:58	-8:02
8	Prayagraj	38	26	12	89786	82144	7642	1102	1453	-350	1507:35	1362:35	145:00	19:39	25:45	-6:05
9	Secunderabad	24	20	4	79824	77182	2642	882	828	55	1364:20	1306:20	58:00	15:09	13:58	1:11
10	Jaipur	24	18	6	85511	81698	3813	915	1097	-182	1348:40	1332:05	16:35	14:56	18:01	-3:05
11	Chennai	28	24	4	119444	117842	1602	885	1002	-117	1912:10	1857:15	54:55	14:51	16:30	-1:38
12	Bengaluru	18	10	8	122654	110282	12372	1405	2204	-799	2008:15	1780:40	227:35	24:05	36:50	-12:44
		304	**224**	**80**	**1149867**	**1067106**	**82761**	**914**	**1102**	**-188**	**18310:55**	**16798:35**	**1512:20**	**14:47**	**18:02**	**-3:15**
Source: Corrigendum 5 (Dated 18.9.2020) and Authors' Analysis																

Exhibit 4: Schedule of the Bidding Process

Qualification Stage

No.	Event Description	July 1st 2020	August 21st 2020	September 18th 2020
1.	Last date for receiving queries	16.07.2020	16.07.2020	16.07.2020
2.	First Pre-Application Conference	21.07.2020	21.07.2020	21.07.2020
3.	Authority response to queries latest by	31.07.2020	31.07.2020	31.07.2020
4.	Last date for receiving queries for second pre-application conference	07.08.2020	07.08.2020	07.08.2020
5	Second Pre-Application Conference	12.08.2020	12.08.2020	12.08.2020
6	Authority response to queries latest by	21.08.2020	21.08.2020	21.08.2020
7	Application Due Date	08.09.2020	07.10.2020	07.10.2020
8	Announcement of short-list	Within 60 days of Application Due Date	Within 45 days of Application Due Date	Within 30 days of Application Due Date

Bid Stage

No.	Event Description	July 1st 2020	August 21st 2020	September 18th 2020
1.	Sale of Bid Documents	To be specified	27.11.2020	10.11.2020
2.	Last date for receiving queries	To be specified	10.12.2020	19.11.2020
3.	Pre-Bid Conference 1	To be specified	18.12.2020	24.11.2020
4.	Authority response to queries latest by	To be specified	30.12.2020	1.12.2020
5.	Pre-Bid Conference 2	To be specified	18.01.2021	12.12.2020
6.	Bid Due Date	To be specified	31.03.2021	12.01.2021
7.	Opening of Bids	On Bid Due Date	On Bid Due Date	On Bid Due Date
8.	Letter of Award (LOA)	Within 45 days of Bid Due Date	Within 30 days of Bid Due Date	Within 30 days of Bid Due Date
9.	Validity of Bids	120 days of Bid Due Date	120 days of Bid Due Date	120 days of Bid Due Date
10.	Signing of Concession Agreement	Within 30 days of award of LOA	Within 30 days of award of LOA	Within 30 days of award of LOA

Source: Corrigendum No. 5 (Dated 18.9.2020), Corrigendum No. 4 (Dated 21.08.2020), Request for Qualification for Passenger Train Operation in Cluster 1 (Mumbai 1) Tender Reference Number: 2020/Trans.Cell/Elect.Train/I, Ministry of Railways, Government of India.

Exhibit 5: Participants in Meetings

No.	Full name of organisation	First meeting (Y/N)	Second meeting (Y/N)	Type of Organization	Domain of business (closest to running passenger trains)	Prior PPP Experience	CTO (Y/N)
1	IRCTC Limited	Y	Y	Public	Catering, tourism and online ticketing	Y	N
2	Medha Servo Drives Pvt Ltd	Y	Y	Private (Indian)	Rail transportation: Manufactures signalling and rolling stock equipment & fuel saving solutions	N	N
3	RK Associates and Hoteliers Pvt Ltd	Y	Y	Private (Indian)	Railway catering as licensee	N	N
4	Bharat Forge	Y	Y	Private (Indian)	Manufactures railway engine parts	Y	N
5	JKB Infrastructure Pvt Ltd	Y	Y	Private (Indian)	Railway station redevelopment	N	N
6	RITES	Y	N	Public	Subsidiary of Indian Railways, Multidisciplinary engineering, and consultancy organization	Y	N
7	Bharat Heavy Electricals Limited	Y	Y	Public	Power generation equipment manufacturer: Traction equipment for railways, electric locomotives	N	N
8	Bombardier Transportation	Y	Y	Private (Foreign)	Rolling stock, signalling solutions	Y (Australia)	N
9	GMR Infrastructure	Y	Y	Private (Indian)	PPP player in Airports, Roads, EPC solutions for railways	Y	N
10	GatewayRail Freight Limited	Y	Y	Private (Indian)	Operates inland container depots, and container train	N	Y
11	Vedanta Group	Y	N	Private (Indian)	Diversified metals and mining company	N	N
12	CAF Group	Y	Y	Private (Foreign)	Rolling Stock, maintenance and simulation systems for training	Y	N
13	Sterlite Power	Y	Y	Private (Indian)	Integrated power transmission developer	Y	N
14	Jason Infra Pvt Ltd	Y	Y	Private (Indian)	Housing construction	N	N

15	Hind Rectifiers Ltd	Y	Y	Private (Indian)	Railway traction equipment	N	N
16	I-Board India Pvt Ltd	N	Y	Private (Indian)	Manufacture of electronic equipment	N	N
17	Alstom Transport India Ltd	N	Y	Private (Foreign)	Manufactures rolling stock and related components	Y	N
18	Megha Engineering and Infrastructure Ltd	N	Y	Private (Indian)	Railway infrastructure: Bridges	Y	N
19	Titagarh Wagons Limited	Y	Y	Private (Indian)	Passenger and freight rolling stock, propulsion and electrical equipment	N	N
20	PSGG Technologies Pvt Ltd	N	Y	Private (Indian)	Auxiliary transport activities: travel agency	N	N
21	BEML	N	Y	Public	Manufactures rolling stock	N	N
22	National Investment and Infrastructure Fund Limited	N	Y	Private (Indian)	Fund Manager	Y (partnered with DP World)	N
23	L&T Infrastructure Development Projects Limited	N	Y	Private (Indian)	EPC solutions for railways	Y	N
24	ISQ Asia Infrastructure Investments PTE Ltd	N	Y	Private (Foreign)	Holding company	N	N
25	Siemens Limited	N	Y	Private (Foreign)	Traction motors and converters, signalling, electrification	Y	N

Sources: **https://www.deccanherald.com/national/private-trains-16-firms-participate-in-pre-application-conference-864027.html**
https://www.dnaindia.com/india/report-indian-railways-private-train-project-gets-positive-response-16-companies-take-part-in-first-pre-bid-meeting-2833458
https://latestnews.fresherslive.com/articles/foreign-cos-among-16-entities-in-pre-bid-for-running-pvt-trains-133437
https://zeenews.india.com/economy/23-players-show-interest-for-running-private-trains-in-india-attend-2nd-pre-application-meeting-2302284.html
https://www.business-standard.com/article/companies/bombardier-alstom-21-others-attend-meeting-on-private-trains-railways-120081201227_1.html
Company Websites

Exhibit 6: Definition of 'Gross Revenue'

'Gross Revenue' of the Project for and in respect of any Accounting Year shall mean the total amount of gross Revenues and receipts of every kind (from both cash and credit transactions computed prior to payment of any commission or service charge or fee thereon) derived by the Concessionaire from the operation of the Trains and provision of services, and/or any other activity related to the Project including Ancillary Facilities, if any, as certified by the statutory auditors of the Concessionaire, and shall include:

I.   Any amount accruing to the Concessionaire from the passengers or any third party from the provision of the following services to the passengers on account of running trains under the Concession Agreement:
a) amount printed on ticket- Fare;
b) amount from preferred seat options, baggage/ luggage, cargo/ parcel (if not included in the ticket fare);
c) amount from on-board services such as- catering, food, beverages, linen, bed roll, entertainment, content on demand, wi-fi, infotainment, value added services, supplementary services (if not included in the ticket fare);
d) amount from cancellation of tickets and/ or other services;
II. Any amount accruing to the Concessionaire on account of use of commercial or other spaces for rent or fee of every description and kind;
III. Any amount accruing to the Concessionaire on account of advertising, branding and naming rights pursuant to this Agreement; and
IV. Any amount accruing to the Concessionaire on account of providing the Ancillary Facilities to Users and/or any third party availing such facilities.

The calculation of revenue shall exclude the following:

I.   Station User Fee collected from the users;
II.   all statutory applicable indirect Taxes such as luxury tax, GST, entertainment tax, expenditure tax, and the like by whatever name called now or in the future, which the Concessionaire is bound to pay;
III. any revenue earned by the Concessionaire on sale of assets of a capital nature which are owned by the Concessionaire;
IV.   interest income from investment made;
V.   dividend income from investments made;
VI.   amount collected but thereafter refunded to the Users on account of cancellation of tickets and/ or any other services;
VII. Damages collected and/ or received from the Government; and
VIII. insurance proceeds except insurance indemnification for loss of revenue.
For the avoidance of doubt, Gross Revenue shall also include any amount received by the Affiliate to whom the Concessionaire has contracted any services, and/or any other activity related to the Project, and any amount received by the Concessionaire from a third party to whom it has contracted any services, and/or any other activity related to the Project.
Source: Draft Concession Agreement for PPP in Passenger Trains, August 2020

Annexure

Table 1: Cluster Services Analysis - Mumbai-1

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Kalburgi (Gulbarga)	Daily	7	21:00:00	Lokmanya Tilak (T)	497	6:55:00	2	9:55	Overnight	3479	69:25	50.12
2	Lokmanya Tilak (T)	Daily	7	7:25:00	Kalburgi (Gulbarga)	497	16:40:00	1	9:15	Day	3479	64:45	53.73
3	Lokmanya Tilak (T)	Daily	7	7:40:00	Ajni (Nagpur)	820	19:30:00	1	11:50	Day	5740	82:50	69.30
4	Ajni (Nagpur)	Daily	7	20:30:00	Lokmanya Tilak (T)	820	7:40:00	2	11:10	Overnight	5740	78:10	73.43
5	Lokmanya Tilak (T)	Daily	7	9:15:00	Madgaon	520	17:40:00	1	8:25	Day	3640	58:55	61.78
6	Madgaon	Daily	7	20:20:00	Lokmanya Tilak (T)	520	4:45:00	2	8:25	Overnight	3640	58:55	61.78
7	Lokmanya Tilak (T)	Daily	7	5:45:00	Manduadih	1496	6:30:00	2	24:45	Overnight+SD	10472	173:15	60.44
8	Manduadih	Daily	7	8:40:00	Lokmanya Tilak (T)	1496	9:30:00	2	24:50	Overnight+SD	10472	173:50	60.24
9	Lokmanya Tilak (T)	Daily	7	17:35:00	Kanpur	1341	14:10:00	2	20:35	Overnight+SD	9387	144:05	65.15
10	Kanpur	Daily	7	17:55:00	Lokmanya Tilak (T)	1341	15:50:00	2	21:55	Overnight+SD	9387	153:25	61.19
11	Lokmanya Tilak (T)	Daily	7	14:30:00	Santragachi	1943	16:20:00	2	25:50	Overnight+SD	13601	180:50	75.21
12	Santragachi	Daily	7	22:00:00	Lokmanya Tilak (T)	1943	23:50:00	2	25:50	Overnight+SD	13601	180:50	75.21
13	Lokmanya Tilak (T)	Tu, Th, Sa, Su	4	23:15:00	Nanded	610	10:00:00	2	10:45	Overnight+SD	2440	43:00	56.74

14	Nanded	W, F, Su, M	4	23:50:00	Lokmanya Tilak (T)	610	10:35:00	2	10:45	Overnight+SD	2440	43:00	56.74
15	Lokmanya Tilak (T)	M, W, F	3	23:55:00	Nanded	773	15:30:00	2	15:35	Overnight+SD	2319	46:45	49.60
16	Nanded	Tu, Th, Sat	3	20:00:00	Lokmanya Tilak (T)	773	10:15:00	2	14:15	Overnight+MD	2319	42:45	54.25
Total/Average						1000			15:52		102156.00	1594:45	64.06

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/I) for Passenger Train Operations Cluster 1 (Mumbai-1) and Corrigendum 5 (Dated 18.9.2020)
Column 11-14: Authors' Analysis

Table 2: Maintenance Facility Location - Mumbai-1

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Mumbai-1	12	1122	Kalburgi	3	Mumbai
			Mumbai	9	

Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Table 3: Cluster Services Analysis - Mumbai-2

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Mumbai Central	Daily	7	16:00	New Delhi	1384	7:00	2	15:00	Overnight+MD	9688	105:00:00	92.27
2	New Delhi	Daily	7	14:45	Mumbai Central	1384	6:00	2	15:15	Overnight+MD	9688	106:45:00	90.75
3	Dadar	Daily	7	0:05	Ahmedabad	483	6:35	1	6:30	Overnight	3381	45:30:00	74.31
4	Ahmedabad	Daily	7	8:30	Dadar	483	15:20	1	6:50	Day	3381	47:50:00	70.68
5	Udhna (Surat)	Daily	7	7:00	Dadar	263	10:15	1	3:15	Day	1841	22:45	80.92
6	Dadar	Daily	7	16:40	Udhna (Surat)	263	19:40	1	3:00	Day	1841	21:00	87.67
7	Dadar	Daily	7	11:50	Vadodara	386	16:05	1	4:15	Day	2702	29:45	90.82
8	Vadodara	Daily	7	17:25	Dadar	386	22:35	1	5:10	Day	2702	36:10	74.71
9	Bandra (T)	TU,F, SU	3	23:45	Akola	713	14:00	2	14:15	Overnight+MD	2139	42:45	50.04
10	Akola	W,SA, M	3	15:15	Bandra (T)	713	5:05	2	13:50	Overnight+MD	2139	41:30	51.54
11	Bandra (T)	TH,F,SU, TU	4	6:10	Nandurbar	410	13:10	1	7:00	Day	1640	28:00	58.57
12	Nandurbar	TH,F,SU, TU	4	13:50	Bandra (T)	410	20:35	1	6:45	Day	1640	27:00	60.74
13	Udhna (Surat)	M	1	8:35	Varanasi	1370	7:20	2	22:45	Overnight+SD	1370	22:45	60.22
14	Varanasi	TU	1	9:00	Udhna (Surat)	1370	8:45	2	23:45	Overnight+SD	1370	23:45	57.68

15	Udhna (Surat)	F	1	8:35	Patna	1679	13:00	2	28:25	Overnight+SD	1679	28:25	59.09
16	Patna	SA	1	14:45	Udhna (Surat)	1679	17:55	2	27:10	Overnight+SD	1679	27:10	61.80
17	Bandra (T)	Daily	7	15:50	New Delhi	1384	7:30	2	15:40	Overnight+MD	9688	109:40	88.34
18	New Delhi	Daily	7	13:30	Bandra(T)	1384	5:25	2	15:55	Overnight+MD	9688	111:25	86.95
19	Indore	M,W,TH, SA	4	14:25	Danapur	1256	16:00	2	25:35	Overnight+SD	5024	102:20	49.09
20	Danapur	TU,TH,F, SU	4	17:40	Indore	1256	20:30	2	26:50	Overnight+SD	5024	107:20	46.81
21	Mumbai (Vasai Road)	Daily	7	18:00	Shirdi	445	3:25	2	9:25	Overnight	3115	65:55	47.26
22	Shirdi	Daily	7	6:30	Mumbai (Vasai Road)	445	17:00	1	10:30	Day	3115	73:30	42.38
23	Mumbai Central	M, W, Su, Th, Sat	5	20:40	Indore	830	8:40	2	12:00	Overnight	4150	60:00	69.17
24	Indore	TU, SA, W, F, Sun	5	22:45	Mumbai Central	830	10:45	2	12:00	Overnight	4150	60:00	69.17
25	Udhna (Surat)	WED	1	21:45	Bhagat Ki Kothi	683	8:55	2	11:10	Overnight	683	11:10	61.16
26	Bhagat Ki Kothi	THU	1	17:35	Udhna (Surat)	683	5:30	2	11:55	Overnight	683	11:55	57.31
27	Indore	Tue	1	11:00	Chittorgarh	307	16:40	1	5:40	Day	307	5:40	54.18
28	Chittorgarh	Tue	1	22:50	Indore	307	4:40	2	5:50	Overnight	307	5:50	52.63
29	Indore	Fri, Mon	2	23:15	Chittogarh	307	5:00	2	5:45	Overnight	614	11:30	53.39
30	Chittorgarh	Sat, Tue	2	7:15	Indore	307	13:05	1	5:50	Day	614	11:40	52.63
Total/Average						793.33			12:34		96042	1404:00	68.41

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/II) for Passenger Train Operations Cluster 2 (Mumbai-2) and Corrigendum 5 (Dated 18.9.2020)
Column 11-14: Authors' Analysis

Table 4: Maintenance Facility Location - Mumbai-2

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Mumbai-2	12	1066	Mumbai	6	Mumbai
			Indore	2	
			Surat	4	
Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020					

Table 5: Cluster Services Analysis - Delhi-1

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	New Delhi	Daily	7	7:50	New Rishikesh	273	13:00	1	5:10	Day	1911	36:10	52.84
2	New Rishikesh	Daily	7	15:40	New Delhi	273	20:50	1	5:10	Day	1911	36:10	52.84
3	Indore	Daily	7	23:55	Nizamuddin	834	11:00	2	11:05	Overnight+MD	5838	77:35	75.25
4	Nizamuddin	Daily	7	12:50	Indore	834	23:45	1	10:55	Day	5838	76:25	76.40
5	New Delhi	Daily	7	19:20	Varanasi	755	6:45	2	11:25	Overnight	5285	79:55	66.13
6	Varanasi	Daily	7	18:15	New Delhi	755	6:00	2	11:45	Overnight	5285	82:15	64.26
7	Anand Vihar	Daily	7	23:10	Darbhanga	1162	21:00	2	21:50	Overnight+SD	8134	152:50	53.22
8	Darbhanga	Daily	7	23:45	Anand Vihar	1162	20:15	2	20:30	Overnight+SD	8134	143:30	56.68
9	Anand Vihar	Daily	7	15:00	Badgam	930	7:50	2	16:50	Overnight+MD	6510	117:50	55.25
10	Badgam	Daily	7	14:00	Anand Vihar	930	7:00	2	17:00	Overnight+MD	6510	119:00	54.71
11	Lucknow	Daily	7	16:15	Anand Vihar	523	22:50	1	6:35	Day	3661	46:05	79.44
12	Anand Vihar	Daily	7	5:20	Lucknow	523	11:50	1	6:30	Day	3661	45:30	80.46
13	Delhi	Daily	7	16:15	Sabarmati	913	5:30	2	13:15	Overnight+MD	6391	92:45	68.91
14	Sabarmati	Daily	7	16:20	Delhi	913	5:20	2	13:00	Overnight+MD	6391	91:00	70.23

15	Indore	Daily	7	6:15	Bhopal	217	10:00	1	3:45	Day	1519	26:15	57.87
16	Bhopal	Daily	7	18:15	Indore	217	22:00	1	3:45	Day	1519	26:15	57.87
Total/Average						701			11:09		78498	1249:30	62.82
Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/III) for Passenger Train Operations Cluster 3 (Delhi-1) and Corrigendum 5 (Dated 18.9.2020) Column 11-14: Authors' Analysis													

Table 6: Maintenance Facility Location - Delhi-1

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Delhi-1	12	898	Delhi area	10	Delhi area
			Lucknow	1	
			Sabarmati	1	
Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020					

Table 7: Cluster Services Analysis - Delhi-2

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Nizamuddin	Daily	7	19:00	Udaipur	734	8:10	2	13:10	Overnight	5138	92:10	55.75
2	Udaipur	Daily	7	16:15	Nizamuddin	734	4:00	2	11:45	Overnight+MD	5138	82:15	62.47
3	Guwahati	Daily	7	8:30	Delhi	1915	11:30	2	27:00	Overnight+SD	13405	189:00	70.93
4	Delhi	Daily	7	15:20	Guwahati	1915	18:00	2	26:40	Overnight+SD	13405	186:40	71.81
5	Barauni	Daily	7	14:00	Anand Vihar	1097	12:00	2	22:00	Overnight+SD	7679	154:00	49.86
6	Anand Vihar	Daily	7	15:30	Barauni	1097	13:00	2	21:30	Overnight+SD	7679	150:30	51.02
7	Pune (Hadapsar)	Daily	7	18:00	Nizamuddin	1522	13:20	2	19:20	Overnight+SD	10654	135:20	78.72
8	Nizamuddin	Daily	7	15:20	Pune (Hadapsar)	1522	11:00	2	19:40	Overnight+SD	10654	137:40	77.39
9	Kathgodam	Daily	7	23:30	Delhi	281	5:45	2	6:15	Overnight	1967	43:45	44.96
10	Delhi	Daily	7	9:05	Kathgodam	281	13:45	1	4:40	Day	1967	32:40	60.21
11	New Delhi	Daily	7	22:30	Jodhpur	620	9:00	2	10:30	Overnight	4340	73:30	59.05
12	Jodhpur	Daily	7	22:30	New Delhi	620	9:00	2	10:30	Overnight	4340	73:30	59.05
Total/Average						1028			16:05		86366	1351:00	63.93
Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/IV) for Passenger Train Operations Cluster 4 (Delhi-2) and Corrigendum 5 (Dated 18.9.2020) Column 11-14: Authors' Analysis													

Table 8: Maintenance Facility Location - Delhi-2

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Delhi-2	12	1028	Delhi area	5	Delhi area
			Pune	2	
			Guwahati	4	
			Kathgodam	1	
Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020					

Table 9: Cluster Services Analysis – Chandigarh

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	New Delhi	Daily	7	17:25	Amritsar	432	23:00	1	5:35	Day	3024	39:05	77.37
2	Amritsar	Daily	7	9:00	New Delhi	432	14:40	1	5:40	Day	3024	39:40	76.24
3	New Delhi	Daily	7	6:30	Chandigarh	266	9:30	1	3:00	Day	1862	21:00	88.67
4	Chandigarh	Daily	7	10:15	New Delhi	266	13:15	1	3:00	Day	1862	21:00	88.67
5	New Delhi	Daily	7	14:00	Chandigarh	266	17:00	1	3:00	Day	1862	21:00	88.67
6	Chandigarh	Daily	7	17:55	New Delhi	266	20:55	1	3:00	Day	1862	21:00	88.67
7	Lucknow	Daily	7	21:05	SVDK-Katra	1055	15:30	2	18:25	Overnight+SD	7385	128:55	57.29
8	SVDK-Katra	Daily	7	21:30	Lucknow	1055	14:30	2	17:00	Overnight+SD	7385	119:00	62.06
9	Amritsar	W, SU, F	3	5:00	Faizabad	977	22:15	1	17:15	Day	2931	51:45	56.64
10	Faizabad	TH, M, SA	3	5:00	Amritsar	977	21:00	1	16:00	Day	2931	48:00	61.06
11	Amritsar	Tu	1	9:15	Katra	284	14:00	1	4:45	Day	284	4:45	59.79
12	Katra	Tu	1	15:00	Amritsar	284	19:45	1	4:45	Day	284	4:45	59.79
13	Varanasi	Daily	7	7:30	Bhatinda	1108	5:00	2	21:30	Overnight+SD	7756	150:30	51.53
14	Bhatinda	Daily	7	7:00	Varanasi	1108	4:00	2	21:00	Overnight+SD	7756	147:00	52.76
15	Nagpur	Daily	7	12:30	Chandigarh	1352	8:10	2	19:40	Overnight+SD	9464	137:40	68.75

16	Chandigarh	Daily	7	14:15	Nagpur	1352	11:00	2	20:45	Overnight+SD	9464	145:15	65.16
17	Jabalpur	Daily	7	11:30	Bandra (T)	1272	9:30	2	22:00	Overnight+SD	8904	154:00	57.82
18	Bandra (T)	Daily	7	10:30	Jabalpur	1272	6:00	2	19:30	Overnight+SD	8904	136:30	65.23
19	Habibganj	W,SU,F	3	17:55	Pune (Hadapsar)	905	8:30	2	14:35	Overnight	2715	43:45	62.06
20	Pune (Hadapsar)	TH, M,SA	3	15:20	Habibganj	905	4:15	2	12:55	Overnight+MD	2715	38:45	70.06
21	Bhopal-Sant Hirda	Tue	1	7:15	Ajmer	644	18:30	1	11:15	Day	644	11:15	57.24
22	Ajmer	Tue	1	21:00	Bhopal-Sant Hirda	644	8:15	2	11:15	Overnight	644	11:15	57.24
						778.27			12:32:16		93662.00	1495:50	62.62

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/V) for Passenger Train Operations Cluster 5 (Chandigarh) and and Corrigendum 5 (Dated 18.9.2020)

Column 11-14: Authors' Analysis

Table 10: Maintenance Facility Location – Chandigarh

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Chandigarh	12	1034	Amritsar area	2	Chandigarh area
			Bhopal	3	
			Chandigarh	2	
			Delhi	1	
			Lucknow	2	
			Varanasi	2	
Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020					

Table 11: Cluster Services Analysis – Howrah

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Ranchi	Daily	7	6:00	Shalimar	461	13:20	1	7:20	Day	3227	51:20	62.86
2	Shalimar	Daily	7	15:10	Ranchi	461	22:30	1	7:20	Day	3227	51:20	62.86
3	Howrah	TU, F	2	18:15	Pune	2020	21:20	2	27:05	Overnight+SD	4040	54:10	74.58
4	Pune	TH, SU	2	6:55	Howrah	2020	11:00	2	28:05	Overnight+SD	4040	56:10	71.93
5	Howrah	Mon	1	12:00	Puri	525	19:50	1	7:50	Day	525	7:50	67.02
6	Puri	Mon	1	21:30	Howrah	525	5:05	2	7:35	Overnight	525	7:35	69.23
7	Howrah	Daily	7	15:50	Chennai	1662	17:30	2	25:40	Overnight+SD	11634	179:40	64.75
8	Chennai	Daily	7	20:00	Howrah	1662	22:00	2	26:00	Overnight+SD	11634	182:00	63.92
9	Howrah	Daily	7	23:20	Bokaro	400	5:20	2	6:00	Overnight	2800	42:00	66.67
10	Bokaro	Daily	7	6:20	Howrah	400	12:20	1	6:00	Day	2800	42:00	66.67
11	Puri	W, F , SU	3	21:30	Shalimar	525	5:05	2	7:35	Overnight	1575	22:45	69.23
12	Shalimar	TU, TH, SA	3	20:10	Puri	525	3:45	2	7:35	Overnight	1575	22:45	69.23
13	Puri	Tue	1	5:30	Shalimar	525	13:00	1	7:30	Day	525	7:30	70.00
14	Shalimar	Mon	1	20:10	Puri	525	3:45	2	7:35	Overnight	525	7:35	69.23

15	Shalimar	M, TH, SA	3	5:50	Ranchi	461	12:10	1	6:20	Day	1383	19:00	72.79
16	Ranchi	M, TH, SA	3	12:40	Shalimar	461	19:40	1	7:00	Day	1383	21:00	65.86
17	Puri	W, F, Sun	3	5:45	Vizianagaram	406	12:05	1	6:20	Day	1218	19:00	64.11
18	Vizianagaram	W, F, Sun	3	12:30	Puri	406	18:30	1	6:00	Day	1218	18:00	67.67
19	New Bongaigaon	M, SA	2	5:20	Howrah	812	19:30	1	14:10	Day	1624	28:20	57.32
20	Howrah	F, SU	2	7:00	New Bongaigaon	812	21:25	1	14:25	Day	1624	28:50	56.32
21	Howrah	Tue	1	7:00	Agartala	1561	10:30	2	27:30	Overnight+SD	1561	27:30	56.76
22	Agartala	Wed	1	15:00	Howrah	1561	19:30	2	28:30	Overnight+SD	1561	28:30	54.77
23	Howrah	Daily	7	16:35	Anand Vihar	1445	9:00	2	16:25	Overnight+MD	10115	114:55	88.02
24	Anand Vihar	Daily	7	13:05	Howrah	1445	7:55	2	18:50	Overnight+SD	10115	131:50	76.73
25	Howrah	TU,TH,SA	3	22:40	Manduadih	764	10:45	2	12:05	Overnight	2292	36:15	63.23
26	Manduadih	W,F,SU	3	16:10	Howrah	764	5:00	2	12:50	Overnight+MD	2292	38:30	59.53
27	Howrah	Mon	1	14:25	New Bongaigaon	812	4:05	2	13:40	Overnight+MD	812	13:40	59.41
28	New Bongaigaon	Tue	1	5:20	Howrah	812	19:30	1	14:10	Day	812	14:10	57.32
29	Howrah	Thu, Sat	2	8:35	Jasidih	310	13	1	4:25	Day	620	8:50	70.19
30	Jasidih	Thu, Sat	2	14:00	Howrah	310	18:25	1	4:25	Day	620	8:50	70.19
31	Sealdah	SU, W, F	3	23:50	Guwahati	1020	19:30	2	19:40	Overnight+SD	3060	59:00	51.86
32	Guwahati	M, TH, SA	3	21:00	Sealdah	1020	14:55	2	17:55	Overnight+SD	3060	53:45	56.93
33	Sealdah	Tue	1	18:30	Patna	532	2:45	2	8:15	Overnight	532	8:15	64.48

34	Patna	Wed	1	7:45	Sealdah	532	16:35	1	8:50	Day	532	8:50	60.23
35	Howrah	Daily	7	14:35	Bhagalpur	425	22:10	1	7:35	Day	2975	53:05	56.04
36	Bhagalpur	Daily	7	6:25	Howrah	425	14:05	1	7:40	Day	2975	53:40	55.43
						815			**12:40**		**101036**	**1528:25**	**66.11**

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/VI) for Passenger Train Operations Cluster 6 (Howrah) and Corrigendum 5 (Dated 18.9.2020)
Column 11-14: Authors' Analysis

Table 12: Maintenance Facility Location – Howrah

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Howrah	12	1032	Howrah	7	Howrah
			Ranchi	1	
			Puri	1	
			New Bongaigaon	1	
			Sealdah	1	
			Bhagalpur	1	

Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Table 13: Cluster Services Analysis – Patna

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	New Delhi	Daily	7	12:30	Patna	998	23:40	1	11:10	Day	6986	78:10	89.37
2	Patna	Daily	7	22:45	New Delhi	998	10:00	2	11:15	Overnight	6986	78:45	88.71
3	Patna	Daily	7	5:30	Manduadih	230	9:45	1	4:15	Day	1610	29:45	54.12
4	Manduadih	Daily	7	16:00	Patna	230	20:10	1	4:10	Day	1610	29:10	55.20
5	Gaya	Mon	1	20:35	Anand Vihar	989	9:10	2	12:35	Overnight	989	12:35	78.60
6	Anand Vihar	Sat	1	13:15	Gaya	989	23:50	1	10:35	Day	989	10:35	93.45
7	Gaya	Sun	1	6:30	Anand Vihar	989	19:00	1	12:30	Day	989	12:30	79.12
8	Anand Vihar	Sun	1	21:30	Gaya	989	9:45	2	12:15	Overnight	989	12:15	80.73
9	Dhanbad	W, F	2	17:30	Anand Vihar	1175	9:10	2	15:40	Overnight	2350	31:20	75.00
10	Anand Vihar	TU, TH	2	13:15	Dhanbad	1175	3:00	2	13:45	Overnight+MD	2350	27:30	85.45
11	Patna	F ,M	2	23:10	Lokmanya Tilak (T)	1693	3:50	3	28:40	Overnight+SD	3386	57:20	59.06
12	Lokmanya Tilak (T)	SU, W	2	12:15	Patna	1693	17:00	2	28:45	Overnight+SD	3386	57:30	58.89
13	Patna	TH	1	21:00	Lucknow Jn.	526	7:25	2	10:25	Overnight	526	10:25	50.50
14	Lucknow Jn.	F	1	10:00	Patna	526	20:20	1	10:20	Day	526	10:20	50.90

15	Darbhanga	SA	1	16:45	Mumbai (Jogeshwari)	2211	7:45	3	39:00	Two Night	2211	39:00	56.69
16	Mumbai (Jogeshwari)	M	1	12:45	Darbhanga	2211	4:30	3	39:45	Two Night	2211	39:45	55.62
17	Darbhanga	W	1	12:00	Guwahati	904	4:30	2	16:30	Overnight+SD	904	16:30	54.79
18	Guwahati	TH	1	11:30	Darbhanga	904	4:30	2	17:00	Overnight+SD	904	17:00	53.18
19	Darbhanga	F	1	12:00	New Jalpaiguri	430	20:45	1	8:45	Day	430	8:45	49.14
20	New Jalpaihuri	F	1	22:05	Darbhanga	430	7:00	2	8:55	Overnight	430	8:55	48.22
21	Patliputra	M, U, TH, SA, SU	5	23:30	Bengaluru - TCTB	2305	17:15	3	41:45	Two Night	11525	208:45	55.21
22	Bengaluru - TCTB	M,TH, W, F, SA,	5	23:15	Patliputra	2305	13:15	3	38:00	Two Night	11525	190:00	60.66
23	Gorakhpur	W,F	2	23:35	Bengaluru - TCTB	2434	17:15	3	41:40	Two Night	4868	83:20	58.42
24	Bengaluru - TCTB	TU,SU	2	23:15	Gorakhpur	2434	20:20	3	45:05	Two Night	4868	90:10	53.99
25	Patliputra	M, W	2	21:30	Lucknow Jn.	526	7:25	2	9:55	Overnight	1052	19:50	53.04
26	Lucknow Jn.	TU, TH	2	10:00	Patliputra	526	20:00	1	10:00	Day	1052	20:00	52.60
27	Patliputra	F ,W	2	7:30	Gorakhpur	244	13:00	1	5:30	Day	488	11:00	44.36
28	Gorakhpur	TH, TU	2	23:45	Patliputra	244	5:30	2	5:45	Overnight	488	11:30	42.43
29	Patliputra	F	1	20:30	Pune (Hadapsar)	1755	3:25	3	30:55	Two Night	1755	30:55	56.77
30	Pune (Hadapsar)	Sun	1	7:05	Patliputra	1755	15:00	2	31:55	Overnight+SD	1755	31:55	54.99
31	Patna	SA, TU,	2	23:10	Pune (Hadapsar)	1755	4:00	3	28:50	Two Night	3510	57:40	60.87
32	Pune (Hadapsar)	M, TH,	2	7:10	Patna	1755	14:00	2	30:50	Overnight+SD	3510	61:40	56.92
33	Patna	F	1	17:30	Tatanagar	496	3:00	2	9:30	Overnight	496	9:30	52.21

34	Tatanagar	SAT	1	5:30	Patna	496	14:30	1	9:00	Day	496	9:00	55.11
35	Asansol	F	1	19:45	Udhna (Surat)	1845	9:00	3	37:15	Two Night	1845	37:15	49.53
36	Udhna (Surat)	SU	1	23:50	Asansol	1845	9:00	3	33:10	Two Night	1845	33:10	55.63
37	Asansol	TU, W	2	19:15	PURI	596	5:50	2	10:35	Overnight	1192	21:10	56.31
38	PURI	W, TH	2	7:00	Asansol	596	17:30	1	10:30	Day	1192	21:00	56.76
39	Asansol	Weekly	1	19:45	Patna	332	0:45	2	5:00	Day	332	5:00	66.40
40	Patna	Weekly	1	8:45	Asansol	332	14:15	1	5:30	Day	332	5:30	60.36
	Total/Average					1122			18:55:22		94888.00	1546:25	61.36

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/VII) for Passenger Train Operations Cluster 7 (Patna) and Corrigendum 5 (Dated 18.9.2020)
Column 11-14: Authors' Analysis

Table 14: Maintenance Facility Location – Patna

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Patna	12	938	Patna	9	Patna
			Asansol	1	
			Gaya	1	
			Darbhanga	1	

Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Table 15: Cluster Services Analysis – Prayagraj

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Prayagraj	TH, SA	2	23:15	Lokmanya Tilak	1350	20:50	2	21:35	Overnight+SD	2700	43:10	62.55
2	Lokmanya Tilak (T)	F, SU	2	23:15	Prayagraj - Subedarganj	1350	18:50	2	19:35	Overnight+SD	2700	39:10	68.94
3	Prayagraj - Subedarganj	M, W	2	7:00	Ahmedabad	1377	4:20	2	21:20	Overnight+SD	2754	42:40	64.55
4	Ahmedabad	TU,TH	2	6:50	Prayagraj - Subedarganj	1377	6:00	2	23:10	Overnight+SD	2754	46:20	59.44
5	Prayagraj - Subedarganj	Mon	1	20:00	Gorkhpur	355	4:15	2	8:15	Overnight	355	8:15	43.03
6	Gorkhpur	Tue	1	7:50	Prayagraj - Subedarganj	355	16:30	1	8:40	Day	355	8:40	40.96
7	Prayagraj - Subedarganj	Sun, Wed	2	12:50	Agrafort	442	20:00	1	7:10	Day	884	14:20	61.67
8	Agrafort	Sun, Wed	2	21:10	Prayagraj - Subedarganj	442	4:00	2	6:50	Overnight	884	13:40	64.68
9	Prayagraj - Subedarganj	Mon, Thu	2	6:10	Lucknow	200	10:00	1	3:50	Day	400	7:40	52.17
10	Lucknow	Mon, Thu	2	17:00	Prayagraj - Subedarganj	200	21:00	1	4:00	Day	400	8:00	50.00
11	Prayagraj - Subedarganj	F	1	14:00	Puri	1162	11:00	2	21:00	Overnight+SD	1162	21:00	55.33
12	Puri	SA	1	14:00	Prayagraj - Subedarganj	1162	10:50	2	20:50	Overnight+SD	1162	20:50	55.78
13	Kanpur	Daily	7	19:00	New Delhi	440	23:20	1	4:20	Day	3080	30:20	101.54

14	New Delhi	Daily	7	5:20	Kanpur	440	9:40	1	4:20	Day	3080	30:20	101.54
15	Ambala	Daily	7	19:15	Manduadih	953	10:20	2	15:05	Overnight+MD	6671	105:35	63.18
16	Manduadih	Daily	7	21:00	Ambala	953	11:30	2	14:30	Overnight+MD	6671	101:30	65.72
17	Prayagraj - Subedarganj	M,W,F	3	22:15	Pune (Hadapsar)	1415	21:20	2	23:05	Overnight+SD	4245	69:15	61.30
18	Pune (Hadapsar)	TU,TH,SA	3	22:20	Prayagraj - Subedarganj	1415	21:05	2	22:45	Overnight+SD	4245	68:15	62.20
19	Gorakhpur	TU,SU,TH	3	7:00	Mumbai (Jogeshwari)	1960	16:45	2	33:45	Overnight+SD	5880	101:15	58.07
20	Mumbai (Jogeshwari)	W, M,F	3	17:50	Gorakhpur	1960	6:00	3	36:10	Two Night	5880	108:30	54.19
21	Prayagraj - Subedarganj	TU, SA	2	19:00	Bengaluru - TCTB	1928	7:00	3	36:00	Two Night	3856	72:00	53.56
22	Bengaluru - TCTB	TH, M	2	15:30	Prayagraj - Subedarganj	1928	4:30	3	37:00	Two Night	3856	74:00	52.11
23	Pune	SU	1	10:40	Dibrugarh	3449	5:30	4	66:50	Two Night	3449	66:50	51.61
24	Dibrugarh	W	1	9:45	Pune	3449	4:30	4	66:45	Two Night	3449	66:45	51.67
25	Pune	Sat	1	5:15	Kalburgi	377	10:35	1	5:20	Day	377	5:20	70.69
26	Kalburgi	Sat	1	15:15	Pune	377	20:35	1	5:20	Day	377	5:20	70.69
27	Habibganj	W	1	17:15	Agartala	2491	21:30	3	52:15	Two Night	2491	52:15	47.67
28	Agartala	SA	1	14:00	Habibganj	2491	17:10	3	51:10	Two Night	2491	51:10	48.68
29	Agartala	F	1	23:50	Karimganj	205	4:00	2	4:10	Overnight	205	4:10	49.20
30	Karimganj	SA	1	7:00	Agartala	205	10:45	1	3:45	Day	205	3:45	54.67
31	Habibganj (SHRN)	M	1	20:00	Rajkot	940	14:00	2	18:00	Overnight+SD	940	18:00	52.22
32	Rajkot	TU	1	16:00	Habibganj (SHRN)	940	8:45	2	16:45	Overnight+MD	940	16:45	56.12

33	Jhansi	TH, SA, M	3	17:25	Bandra (T)	1213	13:00	2	19:35	Overnight+SD	3639	58:45	61.94
34	Bandra (T)	F, SU, TU	3	14:10	Jhansi	1213	10:00	2	19:50	Overnight+SD	3639	59:30	61.16
35	Jhansi	W	1	11:30	Prayagraj - Subedarganj	410	19:15	1	7:45	Day	410	7:45	52.90
36	Prayagraj	Thu	1	5:00	Jhansi	410	11:30	1	6:30	Day	410	6:30	63.08
37	Gorakhpur	M,W,F.Sat, Sun	5	8:00	Lucknow Jn.	279	13:00	1	5:00	Day	1395	25:00	55.80
38	Lucknow Jn.	M,W,F.Sat, Sun	5	18:00	Gorakhpur	279	23:00	1	5:00	Day	1395	25:00	55.80
						1102			19:39		89786	1507:35	59.56

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/VIII) for Passenger Train Operations Cluster 8 (Prayagraj) and Corrigendum 5 (Dated 18.9.2020) Column 11-14: Authors' Analysis

Table 16: Maintenance Facility Location – Prayagraj

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Prayagraj	12	978	Prayagraj area	4	Prayagraj area
			Pune	1	
			Gorakhpur	2	
			Bhopal	1	
			Kanpur	1	
			Manduadih	2	
			Jhansi	1	

Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Table 17: Cluster Services Analysis – Secunderabad

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Secundrabad - Cherlapalli	Daily	7	19:45	Srikakulam	773	9:30	2	13:45	Overnight	5411	96:15	56.22
2	Srikakulam	Daily	7	15:00	Secundrabad - Cherlapalli	773	5:00	2	14:00	Overnight+MD	5411	98:00	55.21
3	Hyderabad	Daily	7	5:50	Tirupati	700	18:15	1	12:25	Day	4900	86:55	56.38
4	Tirupati	Daily	7	8:40	Hyderabad	700	21:05	1	12:25	Day	4900	86:55	56.38
5	Guntur	Daily	7	23:30	Hyderabad	304	4:20	2	4:50	Overnight	2128	33:50	62.90
6	Hyderabad	Daily	7	22:55	Guntur	304	3:50	2	4:55	Overnight	2128	34:25	61.83
7	Guntur	Daily	7	6:00	Kurnool	387	14:00	1	8:00	Day	2709	56:00	48.37
8	Kurnool	Daily	7	15:15	Guntur	387	22:30	1	7:15	Day	2709	50:45	53.38
9	Tirupati	M,Thu	2	22:00	Varanasi	2005	7:45	3	33:45	Two Night	4010	67:30	59.41
10	Varanasi	W, Sa	2	9:45	Tirupati	2005	21:00	2	35:15	Overnight+SD	4010	70:30	56.88
11	Tirupati	SU	1	22:10	Narsapur	724	12:20	2	14:10	Overnight	724	14:10	51.11
12	Narsapur	M	1	14:30	Tirupati	724	5:15	2	14:45	Overnight	724	14:45	49.08
13	Secundrabad - Cherlapalli	SU,W,F	3	22:30	Lokmanya Tilak	810	9:45	2	11:15	Overnight	2430	33:45	72.00
14	Lokmanya Tilak	TU, TH, SA	3	23:35	Secundrabad - Cherlapalli	810	11:50	2	12:15	Overnight+MD	2430	36:45	66.12

15	Lokmanya Tilak	M	1	11:35	Aurangabad	355	18:15	1	6:40	Day	355	6:40	53.25
16	Aurangabad	TU	1	6:50	Lokmanya Tilak	355	13:25	1	6:35	Day	355	6:35	53.92
17	Visakhapatnam	Daily	7	8:40	Vijaywada	377	14:45	1	6:05	Day	2639	42:35	61.97
18	Vijaywada	Daily	7	16:00	Visakhapatnam	377	22:05	1	6:05	Day	2639	42:35	61.97
19	Visakhapatnam	M, W	2	19:45	Bengaluru TCTB	990	12:30	2	16:45	Overnight+MD	1980	33:30	59.10
20	Bengaluru TCTB	TU, SU	2	18:00	Visakhapatnam	990	12:25	2	18:25	Overnight+MD	1980	36:50	53.76
21	Bengaluru TCTB	TH	1	18:00	Sambalpur	1587	20:35	2	26:35	Overnight+SD	1587	26:35	59.70
22	Sambalpur	SA	1	10:50	Bengaluru TCTB	1587	12:30	2	25:40	Overnight+SD	1587	25:40	61.83
23	Howrah	Daily	7	18:40	Secunderabad	1577	19:30	2	24:50	Overnight+SD	11039	173:50	63.50
24	Secunderabad	Daily	7	6:00	Howrah	1577	9:00	2	27:00	Overnight+SD	11039	189:00	58.41
						882			15:09		79824	1364:20	58.51

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/IX) for Passenger Train Operations Cluster 9 (Secunderabad) and Corrigendum 5 (Dated 18.9.2020) Column 11-14: Authors' Analysis

Table 18: Maintenance Facility Location – Secunderabad

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Secunderabad	12	919	Secunderabad area	6	Secunderabad area
			Visakhapatnam	2	
			Tirupati	1	
			Guntur	3	

Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Table 19: Cluster Services Analysis – Jaipur

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Daurai	Daily	7	17:10	Mumbai (Jogeshwari)	956	8:00	2	14:50	Overnight+MD	6692	103:50	64.45
2	Mumbai (Jogeshwari)	Daily	7	16:25	Daurai	956	6:55	2	14:30	Overnight+MD	6692	101:30	65.93
3	Jaipur	M, SA, W	3	19:15	Mumbai (Jogeshwari)	1156	10:50	2	15:35	Overnight+MD	3468	46:45	74.18
4	Mumbai (Jogeshwari)	TU, SU, TH	3	12:45	Jaipur	1156	4:35	2	15:50	Overnight+MD	3468	47:30	73.01
5	Delhi	Daily	7	14:15	Madar Jn	435	20:40	1	6:25	Day	3045	44:55	67.79
6	Madar Jn	Daily	7	5:35	Delhi	435	12:05	1	6:30	Day	3045	45:30	66.92
7	Bengaluru - TCTB	W	1	11:30	Jaipur	2334	6:05	3	42:35	Two Night	2334	42:35	54.81
8	Jaipur	SU	1	19:20	Bengaluru - TCTB	2334	15:30	3	44:10	Two Night	2334	44:10	52.85
9	Bengaluru - TCTB	TU	1	16:15	Hubli	483	23:30	1	7:15	Day	483	7:15	66.62
10	Hubli	W	1	0:45	Bengaluru - TCTB	483	8:00	1	7:15	Overnight	483	7:15	66.62
11	Jaipur	F	1	12:10	Jaisalmer	606	22:40	1	10:30	Day	606	10:30	57.71
12	Jaisalmer	F	1	1:40	Jaipur	606	12:10	2	10:30	Overnight	606	10:30	57.71
13	Jaipur	Daily	7	18:20	SVDK	953	9:30	2	15:10	Overnight+MD	6671	106:10	62.84
14	SVDK	Daily	7	23:00	Jaipur	953	14:10	2	15:10	Overnight+MD	6671	106:10	62.84

15	Kota	Daily	7	6:50	Madar	374	12:55	1	6:05	Day	2618	42:35	61.48
16	Madar	Daily	7	14:30	Kota	374	20:00	1	5:30	Day	2618	38:30	68.00
17	BGKT	Exc. TU, SU	5	8:30	Chennai	2504	23:45	3	39:15	Two Night	12520	196:15	63.80
18	Chennai	Exc. TH, TU	5	5:45	BGKT	2504	22:00	2	40:15	Overnight+SD	12520	201:15	62.21
19	BGKT	Exc SA	6	5:00	Sabarmati	453	13:00	1	8:00	Day	2718	48:00	56.63
20	Sabarmati	Exc: SA	6	16:10	BGKT	453	23:55	1	7:45	Day	2718	46:30	58.45
21	Bhagat Ki Kothi	TU, W	2	6:00	Jaisalmer	297	11:20	1	5:20	Day	594	10:40	55.69
22	Jaisalmer	TU, W	2	17:00	Bhagat Ki Kothi	297	22:20	1	5:20	Day	594	10:40	55.69
23	Jaipur	F, SA	2	15:00	Udaipur	429	22:35	1	7:35	Day	858	15:10	56.57
24	Udaipur	SA, SU	2	8:35	Jaipur	429	15:50	1	7:15	Day	858	14:30	54.62
						915			**14:56**		**85214**	**1348:40**	**63.18**

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/X) for Passenger Train Operations Cluster 10 (Jaipur) and Corrigendum 5 (Dated 18.9.2020)
Column 11-14: Authors' Analysis

Table 20: Maintenance Facility Location – Jaipur

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Jaipur	12	973	Jaipur Area	4	Jaipur area
			Jodhpur	4	
			Ajmer	3	
			Kota	1	

Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020

Table 21: Cluster Services Analysis – Chennai

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Chennai Tambaram	Daily	7	16:00	Madurai	466	22:15	1	6:15	Day	3262	43:45	74.56
2	Madurai	Daily	7	6:00	Chennai Tambaram	466	12:20	1	6:20	Day	3262	44:20	73.58
3	Chennai	TH, SU	2	17:15	Lokmanya Tilak	1212	14:25	2	21:10	Overnight+SD	2424	42:20	57.26
4	Lokmanya Tilak	M , F	2	18:05	Chennai	1212	17:30	2	23:25	Overnight+SD	2424	46:50	51.76
5	Chennai	TU	1	19:10	Mangalor Jn.	889	11:00	2	15:50	Overnight+MD	889	15:50	56.15
6	Mangalor Jn.	W	1	17:05	Chennai	889	8:30	2	15:25	Overnight+MD	889	15:25	57.66
7	Chennai	SA	1	19:00	Tirupati	150	22:00	1	3:00	Day	150	3:00	50.00
8	Tirupati	SU	1	7:00	Chennai	150	10:00	1	3:00	Day	150	3:00	50.00
9	Puducherry	Daily	7	14:40	Kacheguda	894	8:10	2	17:30	Overnight+MD	6258	122:30	51.09
10	Kacheguda	Daily	7	19:30	Puducherry	894	12:40	2	17:10	Overnight+MD	6258	120:10	52.08
11	Chennai	Daily	7	14:00	Coimbatore	496	20:45	1	6:45	Day	3472	47:15	73.48
12	Coimbatore	Daily	7	5:00	Chennai	496	11:45	1	6:45	Day	3472	47:15	73.48
13	Tirunelveli	Daily	7	23:30	Chennai Tambaram	624	9:30	2	10:00	Overnight	4368	70:00	62.40
14	Chennai Tambaram	Daily	7	17:55	Tirunelveli	624	4:00	2	10:05	Overnight	4368	70:35	61.88

15	Tirunelveli	Daily	7	5:00	Coimbatore	459	12:20	1	7:20	Day	3213	51:20	62.59
16	Coimbatore	Daily	7	14:00	Tirunelveli	459	21:30	1	7:30	Day	3213	52:30	61.20
17	Chennai Tambaram	Daily	7	17:15	Tiruchchirapalli	311	21:30	1	4:15	Day	2177	29:45	73.18
18	Tiruchchirapalli	Daily	7	6:00	Chennai Tambaram	311	10:20	1	4:20	Day	2177	30:20	71.77
19	Chennai Tambaram	Daily	7	16:45	Kanniyakumari	712	4:30	2	11:45	Overnight+MD	4984	82:15	60.60
20	Kanniyakumari	Daily	7	21:30	Chennai Tambaram	712	9:20	2	11:50	Overnight	4984	82:50	60.17
21	Kanniyakumari	Daily	7	6:00	Ernakulam	310	12:00	1	6:00	Day	2170	42:00	51.67
22	Ernakulam	Daily	7	14:00	Kanniyakumari	310	20:30	1	6:30	Day	2170	45:30	47.69
23	Chennai	Daily	7	6:00	Nizamuddin	2184	9:00	2	27:00	Overnight+SD	15288	189:00	80.89
24	Nizamuddin	Daily	7	15:35	Chennai	2184	20:00	2	28:25	Overnight+SD	15288	198:55	76.86
25	Kochuveli	TH, F, SA	3	13:30	Lumding	3472	6:00	4	64:30	Two Night	10416	193:30	53.83
26	Lumding	Su, M, Tu	3	20:30	Kochuveli	3472	15:10	4	66:40	Two Night	10416	200:00	52.08
27	Kochuveli	W, TH, F	3	19:50	Ernakulam	217	23:30	1	3:40	Day	651	11:00	59.18
28	Ernakulam	TH, F, SA	3	6:45	Kochuveli	217	10:25	1	3:40	Day	651	11:00	59.18
						885			14:51		119444	1912:10	62.47

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/XI) for Passenger Train Operations Cluster 11 (Chennai) and Corrigendum 5 (Dated 18.9.2020)
Column 11-14: Authors' Analysis

Table 22: Maintenance Facility Location – Chennai

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Chennai	16	1052	Chennai	8	Chennai
			Kochuveli	3	
			Secunderabad	2	
			Coimbatore	1	
			Tiruchchirappalli	1	
			Madurai	1	
Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020					

Table 23: Cluster Services Analysis – Bengaluru

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No	Origin	Days of Operation	Frequency per week	Departure Time (hrs:mins)	Destination	Distance (kms)	Arrival Time (hrs:mins)	Arrival Day	Running Time (hrs:mins)	Category of Service	Train kms per week	Train hours per week	Average Speed (kmph)
1	Bengaluru TCTB	SU, M, W	3	12:15	Lumding	3364	6:00	4	65:45	Overnight+SD	10092	197:15	51.16
2	Lumding	W,Th,SA	3	20:30	Bengaluru TCTB	3364	9:00	4	60:30	Two Night	10092	181:30	55.60
3	Bengaluru TCTB	SA, SU, TU	3	10:00	Hosapete	484	18:45	1	8:45	Day	1452	26:15	55.31
4	Hosapete	SA, SU, TU	3	20:00	Bengaluru TCTB	484	4:45	2	8:45	Overnight	1452	26:15	55.31
5	Mysuru	Daily	7	19:00	Bhubaneswar	1672	22:30	2	27:30	Overnight+SD	11704	192:30	60.80
6	Bhubaneswar	Daily	7	4:00	Mysuru	1672	6:15	2	26:15	Overnight+SD	11704	183:45	63.70
7	New Delhi	Daily	7	21:15	Bengaluru TCTB	2380	5:00	3	31:45	Two Night	16660	222:15	74.96
8	Bengaluru TCTB	Daily	7	20:15	New Delhi	2380	6:20	3	34:05	Two Night	16660	238:35	69.83
9	Howrah	Daily	7	8:00	Bengaluru TCTB	1932	16:50	2	32:50	Overnight+SD	13524	229:50	58.84
10	Bengaluru TCTB	Daily	7	23:45	Howrah	1932	10:00	3	34:15	Two Night	13524	239:45	56.41
11	Bengaluru TCTB	Daily	7	9:30	Shivamogga	288	14:15	1	4:45	Day	2016	33:15	60.63
12	Shivamogga	Daily	7	15:45	Bengaluru TCTB	288	20:30	1	4:45	Day	2016	33:15	60.63
13	Howrah	Daily	7	11:00	Tata Nagar	250	14:30	1	3:30	Day	1750	24:30	71.43

14	Tata Nagar	Daily	7	17:40	Howrah	250	21:20	1	3:40	Day	1750	25:40	68.18
15	Hatia	W, SA	2	6:00	Bengaluru TCTB	1852	15:00	2	33:00	Overnight+SD	3704	66:00	56.12
16	Bengaluru TCTB	Th, Su	2	18:00	Hatia	1852	4:00	3	34:00	Two Night	3704	68:00	54.47
17	Hatia	TU	1	7:20	Patna	425	17:00	1	9:40	Day	425	9:40	43.97
18	Patna	TU	1	18:00	Hatia	425	4:00	2	10:00	Overnight	425	10:00	42.50
						1405			**24:05**		**122654**	**2008:15**	**61.08**

Source: Column 1-10: Request for Qualification Document (No. 2020/Trans.Cell/Elect./Train/XII) for Passenger Train Operations Cluster 12 (Bangalore) and Corrigendum 5 (Dated 18.9.2020)
Column 11-14: Authors' Analysis

Table 24: Maintenance Facility Location – Bengaluru

Cluster Name	No. of Rakes	Rake Utilization (kms per day)	Washing Point	No. of Rakes	Primary Maintenance Depot
Bengaluru	15	1050	Bengaluru	8	Bengaluru
			Bhubaneswar	3	
			Howrah	4	

Source: Draft Feasibility Report, PPP in Passenger Train Project, RITES Limited & Deloitte Touche Tohmatsu India LLP, July 2020