Statistics C&W and Performance Parameters

P/RST

- Railway Statistics: Essential for planning prioritizing and exceeding activities connected with
- operation.
- The railway statistics are based on four factors -
- Quantity
- Distance
- Duration and
- service.
- In Railway environment these relate to -

1. Primary Units:

- (a) Quantity Expressed as tonnes and number of passenger carried and earnings derived.
- (b) Distance Expressed in kilometres.
- (c) Duration- Expressed in minutes, hours & days
- (d) Service performed Expressed in terms of trains, vehicles, wagons Engines.
- 2. Fundamental Units: Relationship between primary units, expressed in composite terms is called 'Fundamental units'.
- The fundamental units express two primary ideas in their relationship to one another viz.
- Tonne-kms, Passenger kilometres, Train-kilometres,
- Wagon-kilometres, Engine hours,
- Wagon days etc.

3. Derived Units:

- Expresses the relationship that exists between two sets of primary or fundamental units and the results thus arrived is termed 'Derived Units'.
- The process by which this relationship is ascertained is as illustrated in the following examples.
- (a) Passenger earning (Primary): Passenger carried (Primary) = Earning per passenger
- (b) Passenger earning (Primary): Passenger kilometres (fundamental) = Earning per passenger kilometre.
- (c) Passenger kilometer (fundamental): Number of passenger (Primary) = Average distance travelled by a passenger also called lead of passenger traffic.

- (d) Wagon kilometres (fundamental): Wagon days (fundamental) = Wagon kilometres per
- wagon day.
- These 'Derived Units' highlight special features of transportation output and are useful in evolving
- suitable management strategies

- Classification of Railway Statistics:
- The principal heads under which the railway statistics are generally grouped are indicated below:
- Economic and financial statistics:
- Under this head are to be included detailed statistics relating to the advance statement of gross
- earning and traffic handled i.e.the number of passenger booked and tonnage lifted and wagons
- loaded for current information and the statistics of revenue and expenditure as booked in monthly and
- yearly accounts.
- Operating statistics:
- Operating statistics are broadly be divided into
- (i) Traffic (ii) Power.(iii) Rolling Stock
- (ii) The traffic statistics include statistics of wagons loaded, wagon mobility, wagon usage, train
- loads, train mobility, productive and unproductive services, wagon detention, marshalling yard,
- terminal goods station and punctuality
- (iii) The power statistics include engine usage, fuel and energy consumption, and engine failure
- statistics etc. (iv) Rolling stock holding & availability, repairs& maintenance % age
- Commercial Statistics: Coaching and freight revenue and volumes and earnings by class of

- passengers, for different commodities, claims paid for compensation of goods and parcels lost or
- damaged Rolling stock and workshop repair statistics:
- Under this head are grouped statistics dealing with POH of coaches, wagons, locomotives and other
- information relating to workshop activity.
- Administrative statistics:
- These statistics relating the staff matters, numbers, by categories and classes of staff.
- Other statistics
- Number of stations by
- Class, halt stations
- Standard of interlocking,
- Medical statistics relate to sickness of staff etc
- Engineering statistics give details of track and bridges requiring attention ultra sonic tests done or
- overdue, track renewals, distress bridges etc.

- Compilation of Railway Statistics:
- 1. Compilation of statistics of Indian Railways falls broadly under two categories, namely
- (i) the statistics required to be compiled by the railways for submission to the Railway Board in order to keep
- the Board generally informed about the different activities of the Indian Railways and
- (ii) further detailed Railway statistics which individual railway may undertake for their own respective domestic requirements.

2. The statistical compilation work on the zonal Railways is

in the charge of a Statistical Officer working under Finance deptt.

- The format and the methods of compilation of the monthly Statistical statements and
- the Annual Statistics required to be submitted to the Board are detailed in
- the Manual Statistical Instructions, Volumes I and II respectively.

Operating Statistics:

- 1. Operating Statistics for the various Indian Railways are issued in the form of :
- various pamphlets published periodically by the Railway Board.
- Detailed Statistics relating to each division and gauge are contained in various parts of the 'Domestic' statistics issued quarterly (Parts, I, II and II(B & C).
- 2. Some of the important statistics include.
- Operating ratio: The ratio of workings expense (excluding suspense but including appropriation to
- Depreciation Reserve Fund and Pension Fund) to Gross Earnings.
- (Expenditure incurred in connection with Administration, Operation, Maintenance and repairs of line open for traffic)

- A Passenger Train Performance.
- Punctuality:
- Punctuality is the main criterion for judging passenger train performance,
- some of the statistics compiled separately for 'Mail and Express trains', 'Other Passenger Trains', and 'Mixed' trains are:

Punctuality = ----- x 100

Total no. of Mail/Express trains

- RT = Trains arriving Right Time
- NLT = Trains not loosing time

- Vehicle Kilometres per Vehicles Day:
- This figure indicates by the vehicle days which are the product of average number of coaching
- vehicles on line /in use and the number of days in the period under reference.
- This figure indicates the extent to which coaching vehicles are kept 'on the move'. The main
- factors affecting its value are:
- (a) The average speed of trains
- (b) The average length of train run (average load)
- (c) The idle periods provided for in rake links.

3. Since in the short run, train composition is not susceptible to change,

- it is only by increasing the speeds of trains and tightening up rake links
- \succ that an improved performance can be achieved.
- 4. This result is calculated by dividing the coaching vehicles kilometres by the vehicles days
- which is the product of average number of coaching vehicles on line and the number of days in the period under reference.

Coaching Vehicle Km

Vehicle km. Per Vehicle day = ------

Vehicle day

Average Speeds:

- This figure represents the average time tabled speeds of passenger trains. The higher this figure, the
- better the service to the passengers

Shunting Kilometres per 100 Train Kilometres (Passenger including proportion of Mixed) :

- 1. This figure indicates the amount of unproductive service that has to be performed per 100
- train kilometres (Passenger including proportion of mixed).
- Since the amount of shunting to be done
- on a passenger train depends upon various local factors, the figure will vary from Division to Division and from Railway to Railway,
- traffic conditions remaining constant, is indicative of wasteful shunting.

 The figure is arrived at by multiplying by 100 the quotient of shunting kilometres divided by train kilometres (passenger including proportion of mixed).

 It can be depicted by formula given below:-Shunting Kms x 100

Train kms.

B - Wagon Usage

- Average Starting Wagon Load :
- 1. This figure is compiled separately for coal and coke, heavy merchandise and lightmerchandise,
- thus affording an indication of the extent to which
- wagon space is utilised by stations from which traffic originates.

- It is extremely important that wagons be given as full a load as possible
- because this means economy, in wagon usage and hence engine power and less strain on line and
- yard capacity. Even a slight improvement in the starting wagon load can mean a tremendous saving to the Railway.
- The result is calculated by dividing the number of tonnes loaded by the number of wagons loaded (in terms of four wheelers),
- CR and TR vans as also wagons used for live stock and
- departmental purposes, however, are excluded.

Tonnes Loaded

Average Starting Wagon Load = ------

No. of Wagons Loaded

- Wagon Kilometres per Wagon Day:
- This result is obtained by dividing wagon kilometres by wagon days which is the product of
- daily average number of wagons on line and number of days in period.

Wagon Kms.

• Wagon Km. Per Wagon day = ------

Wagon Days

- This figure is a measure of wagon mobility and indicates the average number of kilometres
- moved by a wagon, on the average, per day, both loaded and empty journeys being included.
- Delays in marshalling yards, delays at stations when loading or unloading, or any other reason.

- Net Tonne Kilometres per Wagon Day :
- 1. This unit is a measure of the revenue earning work done by the wagons and reflects both mobility and loading.
- A decrease in this figure may be due interalia to any of the causes which effect
- the figure of wagon kilometres per wagon day. The proportion of loaded to total wagon kilometer age,
- the average loaded wagon and the relative amount of heavy and light merchandise carried, are some
- of the other factors which may effect this figure.
- 2. The numerator in this case is the net tonne kilometres (excluding departmental) and the denominator wagon days.

Net Tonne kms.

Wagon Turn Round:

- wagon turn round represents the average period of time
- in which a particular wagon completes its average loaded trip
- and after which it again becomes available for loading.

No. of effective wagon holding

• Wagon Turn Round = -----

(Loaded Wagons + Loaded received wagons)

Average Wagon Load during the Run :

 For obtaining this figure net tonne kilometres are divided by loaded wagon kilometres, (the figure relating to departmental trains are excluded).

Net Tonnes Kms.

• Average Wagon Load during the run = -----

Loaded Wagon kms.

Average Speed of Goods Trains :

- This result is calculated separately for 'through goods trains' and all goods trains and is arrived at by dividing
- the total train kilometres by total train engine hours of the concerned service.
- Detentions to goods trains at roadside stations enter into the calculations and have therefore
- the effect of bringing down average speeds.

Train kms.

Average Speed of Goods Trains = -----

Train Engine hours.

Wagon Turn Round:

No. of effective wagon holding

Wagon Turn Round = ------

(Loaded Wagons + Loaded received wagons) Train kms.

Average Speed of Goods Trains = ------

Train Engine hours.

Average Net Train Loads (in tonnes) :

• This figure refers to the average freight load carried in tonnes, i.e., to that portion of load which earns revenue for the railway.

Net Tonne kms.

Average Net Train Loads = ------

Train kms.

- Average Gross Train Loads (in tonnes):
- This figure represents the average overall load of goods trains i.e.
- the freight load plus the weight of the rolling stock.

Gross Tonne kms.

Average Gross Train Loads = -----Train kms

Net Tonne Kilometres per Engine Hour :

- The figure of net tonne kilometres per Engine hour is a very useful index of the efficiency of freight
- working on a division. Net tonne kilometres indicate the amount of revenue earning work done while engine hour measure the cost of if doing it.

Net Tonne kms.

Net Tonne Kilometers per Engine Hours = ------

Engine hours

Average Detention per Wagon :

Total Detention Hours

Average Detention per Wagon = ------

No. of Wagons despatched

- Target figures have been laid down for each yard for detentions to all wagons and through loaded wagons.
- Such targets take into consideration the condition of work and facilities available in the yard concerned.
- Detentions in excess of this figure indicate inefficient yard work.

Locomotive Performance

• Engine Kilometres per Day per Engine in Use

Engine kms.

• Engine kms. per day per engine in use = ------

Engine days in use

- This figure is compiled separately for passenger, mixed and goods train services as well as for all services refers to 'engines in use'.
- This is affected by such factors as:
- 1. The average run of trains. 2. The average speed of trains.
- 3. The engine links
- 4. The location of engine shed with respects to the stations which they serve.
- Engine Kilometres per Day per Engine on Line:

Engine kms.

• Engine kms. per day per eigine on line = ------

Engine days on line

This figure is also compiled by services and for all services put together.

Quantity of Fuel Consumed per Engine Kilometre by Service:

• This figure indicates the fuel consumption in relation to engine kilometres only and does not reflect the tonnes hauled.

Quantity of Fuel Consumed

Quantity of fuel consumed per engine km by service = ------

Engine kms.

Quantity of Fuel Consumed per 1000 Gross Tonne Kilometres by Services:

- This figure indicates the fuel consumption in relation to the work done and is,
- therefore, a better index of fuel consumption than the quantity of fuel consumed per engine kilometer figure.
- The main factor that influences this result is the gross load of the train. It is derived by the formula given below:
- Quantity of Fuel Consumed x 1000
- Gross Tonne kms.
- Traction Energy consumption per engine km and per 1000 gross tonne kms is worked out exactly in the same way, replacing 1000 litres of diesel by kwhs.

Key Statistics

Item	Unit	2017-18	2018-19
PLANT & EQUIPMENT			
Capital-at-Charge	Rs.in crore	@3,24,725.64	#3,48,601.77
Total Investment	Rs.in crore	5,17,324.19	5,73,641.66
Route Length	Kms.	66,935*	67,415
Locomotives	Nos.	11,764	12,147
Passenger Service Vehicles	Nos.	65,327	67,597
Other Coaching Vehicles	Nos.	6,537*	6,406
Wagons	Nos.	2,79,311*	2,89,185
Railway Stations	Nos.	7,318*	7,321

Key Statistics Contd

Item		Unit	2017-18	2018-19
OPERATION:				
Passenger:	Train kms. Vehicle kms	Millions	769.29 26,195	779.24 26,463
Freight:	Train kms Wagon kms	Millions	396.48 18,457*	414.53 19,364
VOLUME OF TRAFFIC:		Millions		
Passengers Originating		Millions	8,286	8,439
Passenger kms.		Millions	11,77,699	11,57,174
Tonnes Originating:\$ Revenue Earning Traffic Total Traffic (incl. non-revenue)		Millions	1,159.55 1,162.64	1,221.48 1,225.29
Net Tonne kms.\$ Revenue Earning Traffic Total Traffic (incl. non-revenue)		Millions	6,92,916 6,93,281	7,38,523 7,38,923

Key Statistics Contd

Item	Unit	2017 - 18	2018 - 19
VOLUME OF TRAFFIC:			
Passengers Originating	Millions	8,286	8,439
Passenger kms	Millions	11,77,699	11,57,174
Tonnes Originatingg:\$			
Revenue Earning:Traffic	Millions	1,159.55	1,221.48
Total Traffic (incl. non- revenue)	Millions	1,162.64	1,225.29
Net Tonne kmsg:\$			
Revenue Earning Traffic	Millions	6,92,916	7,38,523
Total Traffic (incl. non- revenue)	Millions	6,93,281	7,38,923

Key Statistics Contd

Item	Unit	2017 -18	2018 -19
EMPLOYMENT AND WAGES:			
Regular Employees	Thousands	1,270*	1,227
Wage Bill of Regular Employees	Rs. in crore	1,28,714.74*	1,34,364.18
Average Annual Wage Per Regular Employee	in units	10,18,501*	10,97,370
FINANCIAL RESULTS:			
Revenue	Rs.in crore	1,78,725.31	1,89,906.58
Expenses	-do -	1,75,834.22	1,84,780.30
Miscellaneous Transactions	- do -	-1,225.48	-1,352.42
Net Revenue (before dividend)	- do -	1,665.61	3,773.86
Rate of Return on Capital	Percent	0.51	1.08
Dividend on Capital	Rs.in crore	0	0
Shortfall(-)/Excess(+)	Rs.in crore	1,665.61	3,773.86

@ Includes investment (`53449.91 crore) from Capital Fund. # Includes investment
 (`53449.91 crore) from Capital Fund. \$ Excludes Konkan Railway. * Revised ** No

Other Important Statistics

S.N.	Item	Unit	2017-18	2018-19
I.	Rail Network			
1	Route Kilometres			
	(i) BG	Kms.	62,049*	62,891
	(ii) MG	Kms.	3,201*	2,839
	(iii) NG	Kms.	1,685*	1,685
	(iv) Total (all gauges)	Kms.	66,935*	67,415
2	Running Track Kilometres (Total all gauges) "	Kms.	94,270*	95,981
3	Total Track Kilometres (Total all gauges) "	Kms.	1,22,873*	1,23,542
4	Electrified Route Kilometre (Total all gauges) "	Kms.	29,228*	34,319

Important Definitions

Loco Outage and Loco Utilisation

- Loco Outage means the average number of locos available to traffic use in a day (24 hours).
- Thus, the total hours for which the various Locos were available for Traffic use divided by 24 (number of hours in a day) would give the Loco outage.
- Loco outage = Engine Hours for traffic use/ 24
- Loco outage can be prepared service-wise/shed-wise/railway-wise, traction wise etc.
- The actual Loco outage should generally be around the target fixed for each Division.

Wagon Turn Round:

Wagon Turn Round (T) = S/(L+R)

- Where 'S' stand for the effective daily wagon holding or midnight wagon balance of a day (excluding sick, POH wagons in or waiting for shops, like departmental wagons, wagons lent for departmental use, and the wagons used for coaching traffic). '
- L' stands for the total number of wagons loaded on the Division/Railways plus the wagons loaded at Transhipment Point,
- 'R' stands for the total number of loaded wagons received from other Railway/Divisions.

SN.	Item	Unit	2017- 18	2018 -19
П	Rolling stock			
1	Number of Locomotives	(in units)		
	(i) Steam	"	39	39
	(ii) Diesel	"	6,086	6,049
	(iii) Electric	"	5,639	6,059
	(iv) Total	"	11,764	12,147
2	Number of Wagons	"	279311*	2,89,185
3	Number of Coaches-	(in units)		
	(i) Passenger Carriages (including DEMU/ DHMU)	"	55,749	57,134
	(ii) Other Coaching Vehicles	"	6,537*	6,406
	(iii) EMU and MEMU Coaches	"	9,556	10,439
	(iv) Rail Cars	"	22	24
	(v) Total	"	71,864*	74,003

Wagon Utilisation

SN.	Item	Unit	2017 -18	2018- 19
1	Wagon KMs in terms of 8 wheelers	Million	18,457*	19,364
2	Total Carrying Capacity (All Gauges)	MillionTonnes	16.28	16.95
3	Average carrying capacity – wagon (i)BG (ii) MG	Tonnes	(i)61.7 (ii) 31.7	61.6 31.6 4
	Wagon Turn Round (in days) (BG)	Days	5.21	5.00
5	Wagon Kms. per wagon per day (BG)	Kms	206.5	203.9
6	NTKMs per wagon per day (BG)	Kms	7405	7747
7	Ineffective percentage of wagons (B.G)	%age	3.63	3.61

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Coach Utilisation

SN.	Item	Unit	2017 -18	2018- 19
1	Vehicle Kms	Millions		
	(i) Suburban (EMU)	"	2,053*	2,098
	(ii) Non Suburban	"	24,140	24,365
	(iii) Total	"	26,195*	26,463
2	Vehicle Kms per vehicle day (B.G)	Kms.	555	533
3	Ineffective percentage of coaches(B.G) (Passenger Carriage)	Percent	5.89	6.07
	Train Utilisation			
a.	Passenger Train Performance			
1	Number of Passenger trains runs daily	Nos.	13,452	13,523
2	Passenger Train Kms	Millions	769.29	779.24

SN.	Item	Unit	2017 -18	2018- 19
b.	Goods Train Performance			
1	Number of Goods trains runs daily	Nos.	9,141	9,146
2	Goods Train Kms	Millions	396.48	414.53
3	Average Speed of All Goods Train (B.G.) (i) Diesel (ii) Electric (iii) All Traction	Kms./ Hour	(i)22.7 (ii) 23.6 (iii)23.3	22.3 23.8 23.2
4	Average Net load of Goods train (B.G) (All traction)	Tonnes	1,763	1,738
5	Average Gross load of Goods train (B.G)(All traction)	Tonnes	3025	2925

Volume of traffic

SN.	Item	Unit	2017 -18	2018- 19
а	Passenger Traffic (Suburban + NonSuburban)			
1	Passenger Originating	Millions	8,286	8,439
2	Passenger Kilometres	Millions	11,77,699	11,57,174
3	Average Lead	Kms.	142.21	137.1 4
4	Passenger Earnings	in crores	48,643	51,067
5	Average rate per PKMs	Paise	41.30	44.13
6	Number of Passenger carried per day	Millions	22.70	23.12

Volume of traffic

SN.	Item	Unit	2017 -18	2018- 19
b.	Freight Traffic (Revenue)			
1	Tonnes originating	Millions	1,159.55	1,221.48
2	Lead (originating)	Kms.	598	605
3	Freight Earnings excl. Demurrarge/Wharfage	in crores	1,13,523.53	1,22,580.31
4	Frieght NTKMs	Millions	6,92,916	7,38,523
5	Average rate per NTKMs	Paise	163.83	165.98
6	Earnings per million tonne	in crores	97.90	100.35
7	Freight carried per day (including non-revenue)	Millions Tonnes	3.19	3.36

Train Accidents

SN.	Item	Unit	2017 -18	2018- 19
	Train Accidents (Excl. KRCL)	Nos.	72	59
1	Collisions	"	3	0
2	Derailment	"	53	46
3	Level Crossing	"	13	6
4	Fire in trains	"	3	6
5	Miscellaneous	"	0	1
6	Accident per million train kms	"	0.06	0.05

Density

SN.	ltem	Unit	2017 -18	2018- 19	
	Density				
1	Net Tonne Kms per route Km. (BG)	Km.	11.17*	11.75	
2	Passenger Kms per route Km. (BG)	"	18.89*	18.34	
3	Gross Tonne Kms per route Km. (BG)	"	32.35*	33.58	
Comsumption of Fuel/Energy by Locomotive					
(i)	Diesel	Million litres	2,778.43	2749.01	
(ii)	Electric	Million KWH	16,634.17	17681.79 * revised	

Loco Utilisation

SN.	Item	Unit	2017 -18	2018- 19
1	Tractive effort per loco			
	(i) BG	Kgs.	38,166	39,413
	(ii) MG	"	16,879	16,226
2	GTKMs (excl. wt. of engine & dept.) per kg. of tractive effort.	"		
	(i) BG	Kms	4,062*	3,989
	(ii) MG	"	383	401
3	Engine kilometres per day per engine in use (Pass.) (B.G)	Kms.		
	(i) Diesel	"	594	582
	(ii) Electric	"	718	678

Loco Utilisation

SN.	ltem	Unit	2017 - 18	2018- 19
4	Engine kilometres per day per engine in use (Goods)(B.G)			
	(i) Diesel	Kms.	368	351
	(ii) Electric	"	393	387
5	NTKMs per engine hour (BG) All traction	"	17,474	16,571
6	Ineffective percentage of locomotives (B.G)	Percent		
	(i) Diesel	"	8.48	8.53
	(ii) Electric	"	6.80	7.11

SN.	Item	Unit	2017 -18	2018- 19
(A)	Financial Ratios			
1.	Operating ratio	%age	98.44	97.29
2.	Rate of return on Capital	%age	0.51	1.08
3.	Working ratio of IR	%age	92.5	91.9
4.	Operating ratio with subsidy (Cost recovery)	%age	80.0	77.4
5.	Operating ratio for			
	(i)Coaching (passenger)	%age	181.20	192.49
	(ii)Goods (Fright)	%age	58.83	58.72
6.	Debt Servicing as percentage of OWE a	nd as a perce	ntage of Gross	receipts.
	 Debt servicing as percentage of OWE 	%age	13.2	13.6
	ii. Debt servicing as percentage ofGross Receipts		9.5	10.0
7.	Capex to Revenue ratio – Capex (from internal generation) /Revenue	%age	1.7	2.5

SN.	ltem	Unit	2017 -18	2018- 19
(B)	Earning/ Yield Ratios (Based on Apportion Earning)			
8.	Passenger yield/ PKMs	In Paise	41.30	44.13
9.	Freight yield/NTKMs	In Paise	163.83	165.98
	Productivity index			
	i. Employee Productivity		*611539	669252
	ii. Infrastructure Productivity		*6322773	6646180

SN.	Item	Unit	2017 -18	2018- 19
(C)	Asset Utilization			
10.	Utilization of Assets			
	i. NTKMs per wagon per day-(BG)	KMs	7,405	7747
	ii. Wagon KMs per Wagon day-(BG)	KMs	206.5	203.9
	iii. Wagon turn around - BG	In days	5.21	5.00
	iv. Average Load per Wagon - BG	Tonnes	54.5	60.8
(D).	Operating Indices			
11.	Average speed of Goods Train – (BG) – All traction	KM/hour	23.3	23.2

SN.	ltem	Unit	2017 -18	2018- 19
12.	Infective percentage of Rolling Stock – (BG)			
	i. Diesel Locos	%age	8.48	8.53
	ii. Electric Locos	%age	6.80	7.11
	iii. EMU Coaches	%age	12.2	14.4
	iv. Passenger Carriages	%age	5.89	6.07
	v. Other Coaching Vehicles	%age	6.44	5.18
	vi. Wagons	%age	3.63	3.61
13.	Specific Fuel Consumption (Consumption per 1000 GTKMs) – (BG)			
	i. Passenger service - Diesel	Litres	3.53	3.74
	ii. Goods services - Diesel	Litres	2.01*	1.97

SN.	Item	Unit	2017 -18	2018- 19
14.	Specific Energy Consumption (Consumption per 1000 GTKMs) – (BG)			
	i. Passenger service- Electricity	K.Wt. Hrs.	19.4*	18.9
	ii. Goods services -Electricity	K.Wt. Hrs.	5.89	5.83
15.	Punctuality Index – Punctuality (M/Exp. Trains) –(BG)	%age	71.39	69.23
16.	Accident per Million train Kilometers		0.06	0.05
	*Revised			