

Costing on Indian railways

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sptm

Definitions of concepts

- Costs
 - Monetary value of resources used to deliver a good/service
- Price
 - Is the monetary equivalent of benefits or utility value perceived to be received by the customer for a service or good utilized
- Contribution margin== price –cost
- Costs have no direct bearing on pricing

Definitions

- **Overheads:** Expenses which are not directly allocable to any service, and are applied as a percentage of total direct expenditure.
- The overheads percentages are available at [page 63](#) of the Summary of End Results of Coaching Unit Cost.

Central Charges: Expenses on Railway Board and Central institutions.

- Applied as a percentage of the direct expenditure including overheads.
- The Central charges figure are available at [page 63](#) of the Summary of End Results of Coaching Unit Cost.

Freight costing

- **Freight Unit Cost :-** The Freight Unit Cost which is a fully distributed cost is derived by dividing the expenditure including depreciation and interest allocated to an activity by the relevant performance factors
- All the expenses incurred during the year are allocated to the different services and unit costs arrived at.
- The present costing system generates aggregated costs at the Zonal Railway level and it is not possible to arrive the costs specific to a particular division or section

Components of freight costing

- **Commodity**
 - **Type of Wagon**
 - **Number of wagons per rake**
 - **Tare weight**
 - **Payload – load ability**
 - **Lead**
 - **Traction- Electric/Diesel**
 - **Empty Return Ratio (ERR)**
 - **No. of Terminals and Marshalling**
 1. Terminal Expenses
 - a. Documentation
 - b. Other Terminal
 2. Marshalling Expenses
1. Transshipment Expenses
 4. Line haul
 - a) Traction
 - b) Other Transportation
 - c) Track and Signaling distributed on GTKMs
 5. Provision and Maintenance
 1. Unit cost is per wagon day
 2. Wagon days worked out for each trip

Wagon days are computed as:
 $((\text{Lead} * (1 + \text{ERR}\%)) / 300)$
+3 days (for terminals)
+% ineffectives) * No. of wagons
 6. Overhead Charges
 7. Central Charges
 8. Escalation factor

Costing of passenger services-- components

- **Kind of service viz. Rajdhani/ Shatabdi, Mail/ Express, Ordinary.**
- **Length of haul i.e. total distance—Railway-wise & route.**
- **Transit time & Idle time at terminating stations.**
- **Number of trips per year.**
- **Gauge – Broad/ Metre.**
- **Rake Composition – class-wise composition of train.**
- **Capital cost of each type of coach, power car, pantry car etc.**
- **Traction – Electric/Diesel.**
- **Engine Km.:** This is required for distributing signaling cost.
- **Composition of the train**
- **Lead**
- **Depreciation**
- **Interest on capital cost of rake**
- **Repairs and Maintenance of Coaches:** This is taken at 10% of the total capital cost per annum.
- **Vehicles Kms.:** These are to be separately calculated for Diesel and Electric traction in terms of four-wheelers.
- **Terminal Cost (per passenger originating):** Worked out on the basis of number of passengers originating.
- **LINE HAUL COSTS:**
 - **Traction Diesel/Electric(per Vkm):** Distributed using Unit cost of traction per Vkm.
- **Track Maintenance (Per Vkm):**
- **Signaling cost (Per Engine Km.):**
- **Escalation Factor**
- **Overheads:**
- **Central Charges**
- **Loss of path to Goods trains:** Added as a fixed percentage on total cost including OH and Centage
 1. 2% in case Mail/Exp. trains
 2. 8% in case of Shatabdi and Rajdhani type of trains

Issues in costing--freight

- Freight
- No normalization possible
- Delayed –use escalation factor
- Not useful to get OD based rates
- Empty haulage inbuilt–unnecessary, additional
- Empty return rates become irrelevant
- If loadability –why min wt condition
- Depreciation and interest included for all
 - Why crib about cost of capital
 - Why is depreciation not accounted separately
- Overheads and central charges included
 - How can same system be applied for station to station rates

Issues in costing--passenger

- Separate costing of EMU services
 - Reason of high intensity of usage of all assets
 - If vkms or gtkms are units is this valid?
 - Why not do cross subsidization by making it part of overall costing
- Covers
 - Capital costs
 - Depreciation
 - Maintenance costs
 - Loss of freight—notional-escalation
- Is the passenger rates really subsidized? If so how much
- Why distinguish when costs do not—if required why cry—why not do something in costing and rating

Joint costs

- Expense which simultaneously benefits two or more products or department, and where it may not be possible to separate the contribution between the beneficiaries.
- it is essential to allocate the joint cost for the different joint products for determining individual product costs.
- Methods –engineering-physical parameters ; non engineering-sales value etc

Allocation of joint costs

- Why do it
 - Compute inventory costs, cost of goods sold
 - To price goods
 - To reimburse under contracts
 - legal requirements
 - For price regulation
- Value methods
 - Sales value at split off method
 - Constant Gross margin method
 - Estimated net value realizable

Allocation of joint costs

- Physical methods
 - On physical out put parameters

The purpose of the joint-cost allocation is important in choosing the allocation method

The physical-measure method is a more appropriate method to use in rate regulation

Issues to shift to MC

- Need to know demand pattern and forecast future demand to identify demand function
- Know price elasticity of commodities and class of passengers
- Need activity based costing data to get
 - Section wise, unit wise cost data
 - Do OD based rates
- Reassess demand functions whenever new capital inputs are given—interim, changed business environment

Demand forecasting

- Extremely essential tool
 - For assessing marginal costing
 - For assessing market segment potential
 - For investment decisions
 - For capacity augmentation decisions
 - For differential pricing strategies
 - For dynamic pricing strategies

Issues in costing --coaching

- Total costs show
 - Special and misc services –7%
 - High variation in traction costs(12-25%; 6-14)
 - 15% provision and maintenance
 - Overheads 21%
- Considerable scope for rationalization
- Catering does not cost more than 1-1.5%
 - Can contribute more to earnings

Issues in costing -coaching

- PASSENGER TERMINALS
 - Large cost of special and miscellaneous services
 - Cost of terminals is high
 - Large variations across railways—NFR worst
 - Cost of booking a passenger too high
- High line haul cost per PKM in many railways
- UNITS VARY
 - PKM/VKM/GTKM
 - Use VKM—will give operating costs

Statement showing Working Expenses, D.R.F., Interest and Total Coaching Expenses for the year : earnings coaching-

Railway	Working Expenses	D.R.F.	Interest	Total Coaching Expenses
Central	2507.01	178.43	115.1	2800.54
Eastern	2009.93	118.9	45.39	2174.22
East Central	1825.85	237.24	163.27	2226.36
East Coast	673.52	93.22	52.32	819.06
Northern	4817.21	513.58	294.37	5625.16
North Central	2234	345.41	180.56	2759.97
North Eastern	1090.75	104.45	71.92	1267.12
Northeast Frontier	1338.03	142.9	150.73	1631.66
North Western	982.05	97.02	28.65	1107.72
Southern	2704.63	298.49	167.22	3170.34
South Central	2508.24	232.17	88.27	2828.68
South Eastern	1111.75	60.21	39.05	1211.01
South East Central	531.272	81.75	26.92	639.942
South Western	1147.57	114.82	75.11	1337.5
Western	2260.43	255.11	91.1	2606.64
West Central	1554.91	136.52	50.86	1742.29
Total	29297.15	3010.22	1640.84	33948.21

COMPARISON OF COACHING COSTS ACROSS RAILWAYS IN RS/VKM

	TERMINAL COST		LINE HAUL COSTS		PARCEL ETC		CATERING ETC		TOTAL COSTS	
	VKM	IN RS	VKM	IN RS	VKM	IN RS	VKM	IN RS	VKM	WTDA V
C.R.	3.250		14.299		25.159		15.499		18.043	
E.R.	5.297		26.361		41.457		67.962		32.882	
E.C.R.	2.903		22.164		35.471		106.286		25.549	
E.Co.R	2.971		14.997		23.369		22.775		18.380	
N.R.	4.784		22.296		24.351		56.821		27.473	
N.C.R.	2.700		13.892		28.080		34.790		17.175	
N.E.R.	6.693		18.543		31.230		69.763		26.238	
N.F.R.	5.700		31.704		36.165		31.758		37.095	
N.W.R.	2.677		16.669		23.387		18.104		19.529	
S.R.	5.089		17.505		22.519		23.113		22.598	
S.C.R.	2.288		12.983		27.825		14.259		15.584	
S.E.R.	3.297		17.634		57.808		28.182		22.631	
S.E.C.R.	3.053		11.558		18.831		17.435		14.944	
S.W.R.	3.031		23.209		33.021		33.510		26.864	
W.R.	3.874		17.502		40.150		53.724		22.399	
W.,C.R	1.725		14.148		36.971		18.755		16.396	
Total	3.556		17.571		28.355		34.746		21.789	

OVERALL PASSENGER SERVICES COST AS RS PER PASSENGER KM

	M/E&O RD	Mail/Exp ress	A.C. First	First Class	A.C. Sleeper	A.C. 3- Tier	A.C. C	Sleeper Class	Second CL	Ordin ary	First Class	Sleeper Class	Second CL
C.R.	0.26	0.27	0.81	0.05	0.83	0.69	0.41	0.31	0.17	0.21	0.17	1.15	0.20
E.R.	0.74	0.88	5.97	3.74	1.82	1.19	1.85	0.88	0.72	0.55	13.20	2.21	0.52
E.C. R.	0.32	0.27	4.04	10.57	0.10	0.76	1.92	0.26	0.21	0.47	-	-	0.47
E.Co. R	0.56	0.51	4.19	#DIV/0 !	1.05	0.69	0.97	0.66	0.31	0.73	8.16	0.80	0.72
N.R.	0.42	0.53	0.72	33.47	1.30	0.62	0.59	0.46	0.50	0.28	0.89	3.20	0.28
N.C. R.	2.81	3.34	53.61	3508.9 8	12.22	7.23	2.83	20.80	0.82	1.52	-	1.17	1.53
N.E. R.	0.19	0.66	3.08	15.97	3.30	1.51	2.25	1.07	0.29	0.07	-	-	0.07
N.F.R .	1.56	1.27	2.07	0.12	1.68	11.22	1.75	0.78	2.92	3.67	-	-	3.67
N.W. R.	0.33	0.39	4.49	#DIV/0 !	1.22	0.80	1.24	0.48	0.23	0.25	-	11.54	0.24
S.R.	0.38	0.41	3.11	1.12	1.37	0.90	0.75	0.46	0.26	0.29	1.56	0.61	0.28
S.C. R.	0.31	0.29	1.26	11.92	0.71	0.39	0.74	0.29	0.23	0.37	1.19	0.67	0.36
S.E.R .	0.35	0.40	3.27	#DIV/0 !	1.00	0.55	0.43	0.43	0.31	0.28	3.41	1.05	0.24
S.E.C .R.	0.27	0.35	5.83	0.45	1.27	0.65	1.07	0.58	0.18	0.19	1.36	2.00	0.17
S.W. R.	0.47	0.51	1.85	12.48	1.34	0.63	1.05	0.59	0.35	0.40	2.39	0.67	0.38
W.R.	0.30	0.39	3.48	0.94	1.17	0.71	0.49	0.44	0.24	0.18	0.58	57.85	0.16
W,.C. R	0.26	0.24	1.10	0.52	0.32	0.33	0.09	0.32	0.16	0.34	0.23	0.41	0.34
Over all	0.38	0.43	2.43	1.27	0.70	0.75	0.73	0.47	0.29	0.29	0.69	1.10	0.28

OVERALL PASSENGER SERVICES COST RS PER VKM

	M/E&O RD	Mail/E xpress	A.C. First	First Class	A.C. Sleepe r	A.C. 3- Tier	A.C. C	Sleepe r Class	Secon d CL	Ordina ry	First Class	Sleepe r Class	Secon d CL
C.R.	13.93	12.95	12.73	15.12	13.52	13.71	19.66	11.61	15.07	21.18	15.76	13.98	21.70
E.R.	25.11	22.72	27.19	229.00	29.47	30.06	26.94	21.39	21.35	32.78	63.07	21.96	33.87
E.C.R.	21.06	23.37	50.29	88.89	28.94	26.93	49.20	27.24	19.01	18.12	-	-	18.12
E.Co.R	15.38	13.40	11.69	#DIV/0!	13.53	13.18	16.72	12.13	16.47	22.06	10.65	12.60	22.98
N.R.	21.57	20.14	14.02	16.59	24.82	30.94	28.77	18.93	18.83	26.40	25.39	51.82	26.16
N.C.R.	13.56	16.82	10.76	27.62	11.55	13.31	9.09	15.07	80.12	6.68	-	15.70	6.59
N.E.R.	19.24	16.52	19.02	18.71	17.54	17.67	26.41	16.13	16.31	31.28	-	-	32.12
N.F.R.	26.83	24.76	24.23	#DIV/0!	25.29	25.38	29.35	24.64	24.32	33.91	-	-	33.91
N.W.R.	14.72	13.82	14.36	#DIV/0!	15.02	17.58	15.41	12.55	14.89	17.50	-	32.54	17.08
S.R.	17.69	16.46	20.10	14.51	20.54	20.78	20.08	15.37	15.82	24.75	22.36	22.04	24.84
S.C.R.	12.36	11.56	12.00	1177.21	11.39	11.38	13.16	11.66	11.43	15.10	19.54	12.38	15.33
S.E.R.	15.57	13.81	12.92	#DIV/0!	14.23	14.35	13.89	13.70	13.75	21.75	10.90	11.13	26.65
S.E.C.R.	11.99	10.31	12.16	19.59	10.39	10.11	28.22	9.65	11.30	17.18	9.67	10.32	18.19
S.W.R.	21.48	22.10	25.80	24.26	26.41	26.79	22.78	22.21	20.29	20.22	35.52	15.70	20.55
W.R.	17.23	15.41	16.77	19.92	16.95	16.55	14.86	14.46	16.05	25.91	20.33	19.46	26.80
W,C.R	12.06	10.99	9.20	12.87	10.64	10.40	18.32	10.44	12.39	19.82	11.63	16.46	20.12
Overall	16.78	15.91	14.22	22.88	16.13	16.84	20.52	14.70	17.04	19.78	18.33	15.72	20.00

UNIT COSTS FREIGHT BG

	Working Exp.	D.R.F.	Interest	Total Freight	NTKM	COST/
	Incl. Overhead			Expenses		NTKM RS
Central	24724642	1379532	1364873	27469047	38641019000	0.711
Eastern	19298133	1336243	657516	21291892	15710036032	1.355
East Central	18406931	3562639	1793134	23762704	34606628000	0.687
East Coast	20803881	4248323	2002612	27054816	49456570000	0.547
Northern	27904673	3766161	2805895	34476729	43792256000	0.787
North Central	13644091	1039258	1027834	15711183	68480766000	0.229
North Eastern	3978584	425691	530978	4935253	7780471000	0.634
Northeast Frontier	11746418	2361705	2557053	16665176	12338343000	1.351
North Western	8430979	1086147	397937	9915063	18302310000	0.542
Southern	14422686	1632832	1147817	17203335	16232503000	1.060
South Central	28957130	2933241	1501696	33392067	52543139000	0.636
South Eastern	27749083	155291	1051241	28955615	45396752000	0.638
South East Central	15981955	2465017	855119	19302091	44970114000	0.429
South Western	8663621	2116615	1117559	11897795	16305634000	0.730
Western	24525850	2689557	1233275	28448682	49019569000	0.580
West Central	16994358	1959937	769552	19723847	38470580000	0.513
All Rlys.	286233015	33158189	20814091	340205295	5.52047E+11	0.616

UNIT COSTS FREIGHT MG

	Working Exp. Incl. Overhead	D.R.F.	Interest	Total Freight Expenses	NTKM	Cost per NTK M in Rs.
Central	--	--	--	--	--	--
Eastern	--	--	--	--	--	--
East Central	1617945	106624	107896	1832465	39089000	46.88
East Coast	--	--	--	--	--	--
Northern	--	--	--	--	--	--
North Central	--	--	--	--	--	--
North Eastern	1788185	294688	37518	2120391	216432000	9.80
Northeast Frontier	2473094	442265	671911	3587270	441020000	8.13
North Western	2154870	241323	23017	2419210	27933000	86.61
Southern	375678	10464	856	386998	1499000	258.17
South Central	--	--	--	--	--	--
South Eastern	--	--	--	--	--	--
South East Central	--	--	--	--	--	--
South Western	--	--	--	--	--	--
Western	708452	-260348	2960	451064	2958000	152.49
West Central	--	--	--	--	--	--
All Rlys.	9118224	835016	844158	10797398	728931000	14.81

OVERHEAD AND CENTRAL CHANGES AS % OF DIRECT COSTS-FREIGHT

		<i>CENTRAL</i>
	OVERHEADS	<i>CHARGES</i>
Central	26.16	0.61
Eastern	56.82	0.55
East Central	24.89	0.44
East Coast	17.46	1.03
Northern	35.43	0.20
North Central	23.06	0.47
North Eastern	31.21	1.31
Northeast Frontier	30.72	0.22
North Western	30.96	0.66
Southern	32.64	0.58
South Central	22.04	0.64
South Eastern	36.64	0.99
South East Central	22.34	0.02
South Western	16.66	0.58
Western	25.22	0.62
West Central	13.49	0.27
All Rlys.	27.27	0.55

EXPENSES ON FREIGHT SERVICES AS PERCENTAGE OF TOTAL COSTS

MAINT				LINE HAUL						
Items	Documentat ion	Other Terminal Services	Provision & Maintenance	DIESEL	ELECT RIC	TPT	TRAC K	SIGNA L	Overhead s	Total
CR	0.08	12.28	7.09	13.19	22.45	7.95	13.12	3.11	20.73	100.00
ER	0.12	11.66	12.18	8.51	10.70	9.22	9.66	1.10	36.23	100.00
ECR	0.04	15.13	13.81	10.63	16.95	9.09	10.39	1.87	19.93	100.00
ECOR	0.02	10.60	12.95	23.19	12.70	8.87	15.22	1.59	14.87	100.00
NR	0.24	10.24	11.23	12.21	9.19	9.74	18.36	2.63	26.16	100.00
NCR	0.91	14.96	12.86	8.66	24.79	4.85	9.87	4.35	18.74	100.00
NER	0.02	13.41	4.78	19.13	--	18.71	16.81	3.36	23.78	100.00
NFR	0.04	3.13	7.98	17.87	--	11.39	32.91	1.16	23.50	100.00
NWR	0.07	5.12	9.17	35.65	--	12.56	12.68	1.12	23.64	100.00
SR	0.12	11.75	6.46	10.57	20.25	7.89	16.64	1.72	24.61	100.00
SCR	0.03	4.63	10.77	24.32	17.36	9.29	14.34	1.18	18.06	100.00
SER	0.06	19.85	8.85	4.53	17.92	9.67	10.88	1.43	26.82	100.00
SECR	0.02	9.41	12.71	6.42	27.33	11.84	12.03	1.98	18.26	100.00
SWR	0.06	3.07	9.01	46.46	2.21	6.23	18.09	0.60	14.28	100.00
WR	0.04	4.39	9.83	14.69	21.34	12.60	14.19	2.12	20.14	100.00
WCR	0.03	4.65	7.39	23.88	21.36	11.61	12.19	2.49	11.89	100.00
All Rlys.	0.11	9.86	10.21	15.92	15.66	9.72	14.53	1.96	21.43	100.00

Overhead charges as percentage of total expenses --coaching

Rly.	Total Exps. (Gp. A to C)	Overheads	%age of O.H. to Exps. <u>col.3x100</u> col.2	Total Chg. Exps. Col.3+Col.2	Central Charges	%age of CC Total Chg. Exps. <u>col.6x100</u> col.5
1	2	3	4	5	6	4
C.R.	22218417	5786964	26.05	28005381	169010	0.60
E.R	17238271	4503883	26.13	21742154	122392	0.56
E.C.R	18723038	3540541	18.91	22263579	103363	0.46
E.Co.R	7011449	1179196	16.82	8190645	84342	1.03
N.R	44711489	11540072	25.81	56251561	125897	0.22
N.C.R	22547523	5052197	22.41	27599720	19357	0.07
N.E.R	9655462	3015787	31.23	12671249	38945	0.31
N.F.R	11728386	4588181	39.12	16316567	36263	0.22
N.W.R	8428318	2648909	31.43	11077227	75975	0.69
S.R.	24822706	6880641	27.72	31703347	184049	0.58
S.C.R	22885521	5401201	23.60	28286722	190975	0.68
S.E..R	9000511	3109648	34.55	12110159	119717	0.99
S.E.C.R	5254726	1144729	21.78	6399455	12694	0.20
S.W.R	10938098	2436950	22.28	13375048	99472	0.74
W.R.	21006464	5059952	24.09	26066416	164280	0.63
W.C.R	13240793	4182098	31.58	17422891	53696	0.31
Total	269411172	70070949	26.01	339482121	1600427	0.47

Thank You