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CONCEPT OF RAPID INTERCITY TRAIN SERVICE FOR PASSENGER TRAFFIC ON PAKISTAN RAILWAYS

BY

Abdul Qayyum

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Abdul Qayyum[1]

ROLE OF TRANSPORT

It is a universally established fact that transport is a crucial industry to which socio-economical progress and development of the mankind owes its gratitude. In fact transport is an encompassing entity which has its inalienable and in-bed links with all phases of production and distribution of all kinds of goods. The transport of persons is no exception either. The significance of transport to the normal life of a country and more to its development lies fundamentally in the fact that accessibility is essential for the achievement of every other aspect of economic growth and without mobility/accessibility is simply a far cry. Further transport plays an important role in making the available lands more productive, in marketing farm products, in exploiting minerals and forests, in developing new industries, in export and import trade. It is also the only element which, by overcoming geographical and physical barriers, promotes socio-economical contracts between various communities of a nation thus fostering better understanding for the overall national unity. It helps successful implementation of health and education programs and provides necessities of life in abundance in every nook or corner of the country and that too at competitive prices. The comparison of two major modes of mass transportation system in Pakistan is as under:

RAILWAYS

The Railways have the following inherent preponderant, technical and economic characteristics:

- ☐ An independent track laid on its own bed.
- ☐ Special methods of operation such as exact timings, fast running, fixed stopping places and special station equipment.
- ☐ Little resistance to forward running enabling multiple unit train to be formed. But a low co-efficient of adhesion, however, necessitates provision of easily negotiable gradients.
- ☐ Although costly to build and maintain yet the track has a long life.
- ☐ Powerful rolling stock (which cannot be used except on this track) with excellent performance and long life.
- ☐ Direct costs especially fuel consumption are relatively lower.

The Railway is an undertaking whose marginal costs do not increase with the volume of traffic. Its average costs rather decrease favourably and substantially when traffic increases; while the road costs are practically independent of the volume of traffic and are static. Railway is capable of continuous expansions. It is, therefore, of advantage to maintain traffic at an adequate level to ensure low cost per passenger kilometer.

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ROADS / HIGHWAYS TRANSPORT

Road is characterized by the use of separate vehicles having a small unit capacity and road vehicles can easily be placed in service. These are independent of any time table and are able to run to the doors of houses or inside commercial undertakings (door to door transport). These are flexible in use and the personalized nature of the service which these provide offers an indisputable attraction to the users. Their network is as intense as the public Highways. The cost per passenger kilometer for drivers and fuel is high and the average cost decrease with the increase of distance is much lesser than that of the Railways. Besides Road Transport causes noise, vibration, visual intrusion, atmospheric pollution and frequent high number of accidents. Motor way & dual carriage way although provide better traveling condition but still these are under construction in phases in different part of the country and will take lot of time as well as expenditure on constructions. However, these will contribute a lot in the development of our country.

PLANING STRATEGY

The acceleration in the tempo of development activities and the consequent demand for mobility consistently increases the pressure on the Transport and Communication System which requires continuous rehabilitation, expansion, updating and modernization as an integrated system. Transport and Communication System has not in the past received the priority it deserves. This resulted in inadequate capacity improvement, arrears of replacement of overage assets and general deterioration in the quality of services. In the Railway sub-sector huge arrears of depreciated assets have piled up. In the roads sector condition of roads has deteriorated and capacity constraints have put the system to strain. The demand for mobility and consequent pressure on the existing transportation infrastructure has been increasing due to the increase in investment in other sectors of the economy. To overcome the problem and to cater for the pressing requirement, traffic forecast for the Eighth Five Year Plan is based upon an integrated system approach and the following major elements:

i) The inland traffic is projected to grow from 43,400 MTKM(million tonne kilometer) of freight and 155,771 MPKM (million passenger kilometer)of passenger traffic in 1992-93 to 50,240 MTKM of freight and 177,413 MPKM of passenger traffic in 1997-98 at the annual growth rates of 2.97 percent and 2.61 percent respectively.

ii) Assignment of traffic to different modes of transport is made in accordance with the least cost solution to maximize the benefits to the economy. During the Fifth Plan there was a marked shift in traffic from rail to road. Continuation of this trend over a long period would involve extra transportation cost to the economy. In addition, it would involve higher investment for improvement and strengthening of the existing road network. It will also require an extra capital cost for the procurement of additional vehicles. A reversal of this trend, by greater shift of passenger traffic back to the Railways, would help in better utilization of the inherent capacity of the Railways and it will provide the most effective and energy efficient solution, from the national point of view. The long term (by the year 2006) objective is to achieve traffic distribution in the ratio 27:73 between rail and road. Thus, the

strategy adopted from the Sixth Plan aimed at reversal of the trend and movement towards the achievement of this target. But both the sixth and the seventh plans could not achieve the targets and as a consequence the actual ratio fell to 14:86 in 1990-91 and 15:85 in 1992-93. This has been mainly due to the inability of the railways to carry the assigned share of traffic. Even the long haul passenger traffic was diverted to the relatively uneconomical mode of transport by road. The main stress during the Eighth Plan would, therefore, be on the railways to carry its due share of traffic by optimum utilization of its capacity, and also share load of passenger traffic between major industrialized cities to reduce congestion on high ways.

TRAFFIC CARRIED BY RAPID INTERCITY TRAINS

A target of 23 BPKM(billion passenger kilometer) has been projected at the end of 8th Plan period for the passenger sector of Pakistan Railways. The Pakistan Railways passenger sector generated 18.905 BPKM during the year 1995-96 which is much less than the projected target. In order to achieve the target of 23 BPKM, various sets of non-stop intercity express trains have been planned to be introduced by the end of 8th Plan to generate additional traffic. The estimated traffic forecast at 80 % filling capacity will be as under:

Overnight Long Distance Rapid Intercity Trains

Long distance intercity over-night trains have been proposed for business community who would like to spend day in main business center and travel during night to save working time. It will help in promotion of business as well as industrial growth which is considered as back bone of the country.

	TRAINS	BPKM
i)	Overnight Lower A.C. express trains between Lahore - Karachi - Lahore	1.167
ii)	Overnight Lower A.C. express train between Faisalabad - Karachi - Faisalabad	0.786
iii)	Overnight Lower A.C. express train between Multan - Karachi- Multan	0.636
	Total:	2.585

Medium Distance Intercity Trains

Medium distance intercity trains have been proposed between major industrialized cities as detailed below to suit businessmen, students and ordinary public who would prefer to travel rapidly during a day to perform various functions and then come back home without much fatigue.

i)	Non-stop A.C. express train between Karachi - Hyderabad (3 round trips)	0.228
ii)	Non-stop A.C. express train between Lahore - Multan (2 round trips)	0.334
iii)	Non-stop A.C. express train between Lahore - Rawalpindi (2 round trips)	0.556
iv)	Non-stop A.C. express train between Lahore - Faisalabad (3 round trips)	0.177
v)	Non-stop A.C. express train between Rawalpindi - Peshawar (2 round trips)	0.144
	TOTAL:	1.450

Besides, the present 15 Up/16 Dn (Night Coach, 0.778 BPKM) which was introduced in April, 96 has also been taken into account while calculating additional traffic of 4.0 BPKM. The above mentioned trains have been projected with the assumption that there will be no diversion of traffic from other trains presently running and will attract additional traffic from road as well as cater for the demand of traffic as a result of rapid industrialization growth rate. In order to run long intercity trains, an initiative has already been taken by running non-stop trains from the existing available rolling stock. However, a project of manufacturing of 84 high speed coaches has been proposed for manufacturing of coaches in Carriage Factory Islamabad to meet the requirement of various intercity trains.

SHARE OF RAILWAYS IN TRANSPORT

Due to the changing condition of the transport market and of society, the Pakistan Railways has developed its planning and operation to convert it into an up-to-date service industry. The railway can become much more modern, faster, more punctual, more accommodating to its customers requirement and offering a better service. Future technological and scientific development will smooth this path as the "Economic boom is based on innovation" and enhancement of customer appeal and of course, competitiveness can lead to a reversal of the trend towards railway. The growth of passenger traffic is directly related to population, urbanization, industrialization and national income. The Railway is undoubtedly the cheapest mode for long distance transport, characterized by its capacity of mass transportation, comfort and safety. The importance of rail transport potential has assumed new dimensions in view of steeply rising prices of fuel and congestion on roads. In view of this situation Pakistan Railway will have to play a major role in the internal transportation system in the country. The share of passenger traffic in the surface transport (rail & road) in various plan periods is given in Table- I.

TABLE 1- SHARE OF PASSENGER TRAFFIC (RAIL&ROAD)

(Figures in Million)

PLAN	RAIL %	ROAD %	PASSENGER KMS (MILLION)	NO. OF PASSENGER CARRIED (MILLIONS)	AVERAGE NO. OF K.M/PER PASSENGER (KMS)
1st (1955-60)	42	58	8064	102.657	8.5
2nd (1960-65)	37	63	9534	126.28	75.5
3rd (1965-70)	23	77	10025	130.47	76.9
Non (1970-78)	17	83	13199	134.07	80.2
5th (1978-83)	17	83	15631	129.00	129.5
6th(1983-88)	13	87	17436	80.76	215.96
7th (1988-93)	12.5	88	19060	77.30	249.92
8th (1993-98)	11.8	88.2	23000	67.27	262.1
9th (1998-2003)	11.3	88.7	28000	--	--

It would be seen from above that Pakistan Railway was handling large share of passenger traffic (short distance and long distance) in the early decades but this trend changed in early eighties when, the road were developed and automobile industry also grew thus attracting short distance traffic to road. It is also evident from the big jump in the average distance (K.M) traveled per passenger i.e. from 129.5 K.M to 216 K.M in one decade(fifth & sixth plan). It has also been experienced that short distance traffic has been diverted to road and has caused congestion on high ways as well as in big cities. Pakistan Railways has adopted the strategy to concentrate on long lead passenger traffic and will continue to play its role as single major carrier of passenger traffic. With the increase in population at the rate of 3.0 % per annum and resultant increase in economic activities, it is high time for the railway to introduce intercity train between major industrial cities to attract traffic which is increasing day by day as travel by road through air conditioned intercity buses/coaches has become trouble-some. Even, the air traffic between big cities has increased and air tickets are hardly available on short notices.

PASSENGER'S TREND

It would, therefore, be advisable to utilize the spare capacity of Railway on the following main line corridors thus serving our major population/economic activity centers:

- ☐ Karachi - Hyderabad
- ☐ Lahore - Rawalpindi
- ☐ Lahore - Faisalabad
- ☐ Lahore - Multan
- ☐ Rawalpindi - Peshawar

The trend of traveling of intercity passengers in various classes of coaches on Pakistan Railway is given in table II.

TABLE 2- Intercity Passenger Traveling Data (101 - 250 K.M)

(in Thousand)

Class of Coach	1991-92	1992-93	1993-94	1994-95	1995-96
A.C. Sleeper	1715	1762	1811	1962	1741
A.C. Parlour	39716	30907	42802	51877	28589
A.C. Lower	--	3605	4708	33090	38381
Ist Sleeper	17204	20259	5325	19231	17554

It is evident from the above that No. of passenger traveling in lower A.C. coaches is increasing very rapidly due to competitive rates with A.C. road transport and hence, a large scope of intercity traffic for Railway is available provided modern air conditioned coaches with improved facilities as well as running time are introduced on the existing system with minimum stoppage. Each train will have one or two upper class parlour cars.

SPEED AND RUNNING TIME OF INTERCITY TRAINS

The present available stock is designed for maximum speed of 124 KMPH on ideally maintained track but the stock is allowed to run at a speed varying from 65 to 110 KMPH depending upon the track condition. Further improvement in speed as well as reduction in running time can be made either through heavy investment to increase average speed or to introduce such type of modern rolling stock which is designed for higher speed and should have inherent capability to take care of track irregularities at higher speed after taking into account safety of passengers. However, even if heavy investments are made in the track for higher speed, new rolling stock will have to be acquired but during transit period, introduction of new type of rolling stock with selective improvement of track is more economical solution to increase average speed. The comparison of proposed speed and running times of new intercity train is based on the same analogy(phase-1 & 2 respectively). The new rolling stock will have more effective brake power, rapid acceleration/deceleration time and more comfort coupled with safety. The comparative position of running time of intercity trains viz-a-viz existing ones are in table 3.

TABLE-3 (PHASE - 1) COMPARISON OF RAPID INTERCITY TRAIN VIZ-A-VIZ EXISTING TRAIN

SECTION	DISTANCE K.M	NO. OF ROUND TRIP/DAY	RUNNING TIME EXISTING	PROPOSED	SPEED PRES: KM/H	PROPS:
Karachi – Hyderabad	183	3	2' - 00"	1' - 35"	95/110	110/130
Lahore – Faisalabad	141	3	2' - 00"	1' - 35"	90/95	95/110
Lahore – Multan	334	2	6' - 00"	4' - 00"	105	105/120
Lahore – Rawalpindi	287	2	5' - 00"	4' - 00"	65/95	80/110
Rawalpindi – Peshawar	174	2	3' - 45"	2' - 30"	65/95	75/100

TABLE - 3 (PHASE - 2)
COMPARISON OF RAPID INTERCITY TRAIN
VIZ-A-VIZ EXISTING TRAIN

SECTION	DISTANCE K.M	NO. OF ROUND TRIP/DAY	RUNNING TIME EXISTING	PROPOSED	SPEED PRES: KM/H	PROPS:
Karachi – Hyderabad	183	4	2' - 00"	1' - 15"	95/110	120/160
Lahore – Faisalabad	141	4	2' - 00"	1' - 10"	90/95	120/160
Lahore – Multan	334	2.5	6' - 00"	3' - 00"	105	120/160
Lahore – Rawalpindi	287	2.5	5' - 00"	3' - 00"	65/95	100/160
Rawalpindi – Peshawar	174	3	3' - 45"	2' - 30"	65/95	100/140

It is aimed to bring out the best characteristics of each mode of transport by making improvements in these and ensuring optimal utilization of the existing system capacity. However, to develop a transportation system which is large enough and also sophisticated, to cater for the traffic needs of the future, will require a level of investment which will place a heavy burden on public exchanger (phase-2) and such heavy investment is not feasible for proposed small number of intercity trains at this stage. A major policy focus of the time, therefore, will be the continuation of efforts to exploit existing sources with minimum investment by removing spotted bottlenecks and to achieve the best result (phase-1)The spotted bottle necks in track/signaling can be removed from the revenue budget allocation as well as with present ongoing investment for improvement of signaling of various station. The financial analysis is based on this scenario. These intercity trains would even reduce the increasing rush on air transport as is evident from the journey time for both modes of transport as indicated in Table-IV.

TABLE-3 COMPARISON OF JOURNEY TIME
(INCLUDING TERMINAL DELAYS)

SECTION	BY AIR Including Check-in (1 HR) & Check-out (30 MTS) time HRS MTS	BY FAST INTERCITY TRAINS PHASE-I HRS MTS	BY FAST INTERCITY TRAINS PHASE-II HRS MTS
Karachi - Hyderabad	2' - 20"	1' - 35"	1' - 15"
Lahore - Faisalabad	2' - 20"	1' - 35"	1' - 10"
Lahore - Multan	2' - 35"	4' - 00"	3' - 00"
Lahore - Rawalpindi	2' - 35"	4' - 00"	3' - 00"
Rawalpindi - Peshawar	2' - 35"	2' - 30"	2' - 00"

It may be added here that journey time in Phase-1 by fast intercity trains between Karachi - Hyderabad, Lahore - Faisalabad and Rawalpindi - Peshawar will be much less than by air and on Lahore - Multan and Lahore - Rawalpindi is comparatively more by rail but the added advantage of lesser fare, scenic beauty and on-train entertainment like tea/refreshments, video and newspapers etc. would out-weigh the extra time spent during railway journey. Moreover, the railway stations are situated close to the center of city whereas air ports are far away and also take additional time for transportation from air port to city center where main business office/markets are located. However, maximum benefits of intercity train are visible on implementation of Phase-2 which require heavy investment for improvement of track and signaling system.

FARE OF INTERCITY TRAINS

Most of the coaches on each intercity train will be economy air conditioned class (i.e. presently designated as lower A.C) fares of which have been formulated in such a manner that these are favourably comparable with first class sleepers accommodation which are already in great demand. The fares of proposed trains have been fixed about 20% higher than the existing fare of the same class. It is expected that these trains would be highly patronized by the business community who have the capacity to pay higher fare. These trains would run with a regular frequency and fare will be subjected to changes on purely commercial basis. The train fares of parlour car have been formulated in such a manner that these are highly attractive for business men/intermediate class who are presently traveling by air per force, having no comparable alternative choice by surface transport. The economy class air conditioned (Lower A.C) fare would be about 25% of the air fares for short distances like Karachi - Hyderabad and Rawalpindi - Peshawar and 13 to 15 % of the air fares for longer journeys like Lahore - Multan and Lahore - Rawalpindi. Similarly air companies are charging 3-5 times fare when compared with Railway's fares for parlour cars as can be seen from the table-V:

TABLE-5 STATEMENT SHOWING JOURNEY FARES BY AIR, ROAD AND VARIOUS CLASSES OF TRAINS

(All Figures in Rs.)

SECTION	CHEAPEST AIR FARE	EXISTING/PROPOSED FARES	A.C SLEEPER	A.C PARLOUR	A.C LOWER	ROAD FAIR OF A.C BUS/ COACH
KARACHI - HYDERABAD	460	Existing	265	195	95	55
		Proposed	--	226	105	
LAHORE - FAISALABAD	NO FLIGHT	Existing	235	175	75	50
		Proposed		202	100	
LAHORE - MULTAN	1505	Existing	435	295	170	112
		Proposed	--	350	200	
LAHORE - RAWALPINDI	1265	Existing	380	220	140	110
		Proposed	--	260	170	
RAWALPINDI - PESHAWAR	640	Existing	260	195	95	60
		Proposed	--	225	115	

FEATURES OF FAST INTERCITY TRAINS

Major features of the intercity trains are clean and relaxing traveling atmosphere and fast/safe journey. The following additional facilities/benefits will attract maximum passengers to railways:

- ☐ Better seat utilization through seat allocation meeting the passenger's wishes.
- ☐ Information on current & international affairs in the train.
- ☐ Provision of automatic sliding entrance doors and through vestibule passage between coaches
- ☐ More revenue through complete ticket checks.
- ☐ Reduction of deliberate damage caused by passenger.
- ☐ Increase of punctuality through assistance with boarding and alighting of passengers with train location. This ensures that scheduled stopping times are complied with.
- ☐ On train provision of lunch boxes, tea, cold drinks, magazine, newspaper and telephone service.
- ☐ Synchronized point to point connection with other trains.
- ☐ Better air conditioning control system of coaches to make atmosphere comfortable .

SAFETY FEATURES OF FAST INTERCITY TRAINS

Special safety features have been ensured in the locomotive and coaches of fast intercity trains to ensure safety of passengers.

Locomotive

1) Dead Man Paddle

The driver has to keep the paddle of vigilance device pressed through out the journey otherwise brake application as well as no power feature will result if the paddle is left un-pressed for one minute or more.

2) Dynamic Brake

It is a type of brake in which kinetic energy of train is converted back in to electrical energy and helps in controlling the speed of train in addition to conventional brakes.

3) Air Pressure Loss Indication

Train parting whistling/indication appears on locomotive if the train pressure drops below certain defined limit and call for immediate attention of driver for control of train. The whistling/train parting indication will disappear automatically on creation of requisite amount of air pressure.

Coaches

1) Disc Brake

Air brake system fitted on all coaches works independently on fall of air pressure in the train pipe and then brakes are applied on the wheels. Air operated disc brake will be fitted on the axles with disc pad having good stability against extremely high mechanical and thermal stresses at higher speed.

2) Anti Wheel Skid Device

Anti wheel skid devices will be fitted to avoid any over braking/wheel skidding as well as damage to rail due to flat spots in wheel tread. This device will regulate the brake cylinder pressure to avoid wheel skidding.

3) Bearing Temperature Monitoring Device

Axle box bearing temperature monitoring system will be provided in each coach for early warning against rise in temperature of bearing due to some defect to avoid its failure as well as accident.

4) Auto-matic Working of Entrance Door

All the entrance doors of the train will be automatically opened/closed by the guard to avoid any accident at higher speed. The passenger cannot open the entrance door during running of train. The pneumatic control system of doors will be so designed that it open automatically if there is any obstacle in between the doors.

Computerized Control of Brake System

Keeping in view the higher speed of intercity trains, highly accurate gradual and targeted braking system controlled by computer will be provided on the locomotive for high passenger comfort by dint of jerk-free to ensure smooth actuation of the individual coach air braking system. The computer will take care of cost-effective use of the brakes through specification of a priority sequence during brake control (wear-free regenerative dynamic brake or air operated disc brake). Such a system featuring sophisticated signal processing offers the advantage of flexible response to irregularities, thanks to comprehensive function monitoring and multiple redundancy thus ensuring for high availability of effective brake power. The brake control devices in the entire train operate in parallel and independently of one another receiving identical control signals and data from the train control unit i.e.

- ☐ Brake power requirement for the whole train.
- ☐ Train speed, determined by the train control unit on the basis of sensor signal and all wheel speeds supplied by the anti-skid devices.
- ☐ Total of all part-failure reported by the individual brake control devices.
- ☐ Actual brake power of the regenerative brakes is directly controlled by the train control unit.

On the basis of these and a series of other data, the brake control unit calculates the target values for the dynamic brakes & disc brakes by reference to stored boundary characteristic line of the braking modes installed in the train and based on reported part-failure of individual brakes on board, the brakes are automatically compensated for by exploitation of the existing brake power redundancy. This method of set point calculation yields dynamic advantage in the interaction of the brakes because of the actuation of the sub-ordinate brake does not entail a wait until the higher priority brake has reached its boundary characteristic curve. The dynamic brake is applied first and as soon as the dynamic brakes have reached their limiting power, these are successively complimented by the disk brake.

The idea underlying this sequence was primarily to use wear-free dynamic brakes with a view to use the high wear disc brake as sparingly as possible. Parallel to the electronic braking system, which is designed as the normal braking mode, an independent additional pneumatic control system-combined with electric emergency brake loop is provided as a safety level for emergency braking.

REQUIREMENT OF ROLLING STOCK FOR INTERCITY TRAINS

Coaches and Power Vans

The composition of trains has been formulated in such a manner that optimal utilization of line capacity is made by running longer and faster trains. The composition of various train sets and train frequency on various routes has been made keeping in view the market demand as given in table -VI

TABLE -6 MINIMUM REQUIREMENT OF COACHES

	TRAIN COMPOSITION ON EACH RAKE			NO. OF RAKES	TOTAL NO. OF STOCK REQUIRED FOR EACH SECTION			NO. OF ROUND TIPS PER RAKE/DAY
Karachi -Hyderabad	2	8	2	1	2	8	2	3
Lahore-Multan	2	8	2	1	2	8	2	2
Lahore-Rawalpindi	2	7	2	2	4	14	4	2
Lahore-Faislabad	2	8	2	1	2	8	2	3
Rawalpindi-Peshawar	1	4	1	1	1	4	1	2
			Total (Bare requirement)		11	42	11	

In addition to above, spare stock would also be required to cater for maintenance, overhauling and other emergencies at different locations to avoid inconvenience to passengers of reserved accommodation. Thus, total requirement of coaching stock is given in table -VII

TABLE - 7 TOTAL REQUIREMENT OF COACHING STOCK

		BARE REQUIREMENT	MAINTENANCE SPARES	TOTAL
i)	Parlour Cars	11	5	16
ii)	Lower A.C	42	10	52
iii)	Power Vans	11	5	16
			Grand Total:	84

Locomotives

Each of the 6 rakes will have its own dedicated locomotive so that train schedules are not allowed to be disturbed due to non-availability of a locomotive at a given time for any of these trains. Besides, allowance for spare stock will also have to be made for these special high speed locomotives to meet the requirement of normal maintenance, overhauling as well as other un-foreseen emergencies. Keeping in view the high speeds and train loads, the horse power of the locomotives shall be of the order of about 4000. The total requirement of Locomotive would be thus as under:

Bare requirement	=	6
Maintenance spares	=	2
Total:	=	8

FINANCIAL APPRAISAL

The project envisages purchase of Locomotives and material for manufacture of coaches for introduction of high speed Intercity Trains between Lahore-Rawalpindi, Lahore-Faisalabad, Lahore-Multan, Rawalpindi-Peshawar and Karachi-Hyderabad as proposed in phase-1.

Procurement/Manufacturing schedule of rolling stock is as under:				
YEAR	A.C.C. PARLOUR	A.C.C. LOWER	POWER VANS	LOCOMOTIVE
1998	8	26	8	4
1999	8	26	8	4
GRAND TOTAL	16	52	16	8

These ACC Parlour, ACC Lower Coaches, Power Vans and Locomotive will be used as unit trains on main line.

CAPITAL COST

The Cost of ACC Parlour, ACC Lower, Power Vans and Locomotive have been charged according to the procurement/manufacturing schedule. The cost of imported material including CD/ST for above items will come to Rs.3345.970 million as per detailed given below.

PROJECT COST BREAK-UP

(RUPEES IN MILLION)

S. NO.	ITEM OF WORK	F.E.C	LOCAL	TOTAL
1.1	F.O.B. COST OF MATERIAL	1997.163	---	1997.163
1.2	CUSTOM DUTY AND OTHER IMPORT CHARGES	---	1348.808	1348.808
1.3	INDIGENOUS MATERIAL	---	277.757	277.757
1.4	LABOUR CHARGES	---	272.145	272.145
4.	MAINTENANCE FACILITIES	45.000	40.000	85.000
5.	JIGS,FIXTURES, TRAINING, SERVICE ENGINEER'S CHARGES AND ADDITIONAL EQUIPMENT, TOOLS ETC.	10.000	6.000	16.000
6.	CONTINGENCIES @ 3 %	---	119.127	119.127
	TOTAL :-	2052.163	2063.838	4116.000

MAINTENANCE FACILITIES

Rs. 85.000 million have been provided for rehabilitation and balancing of maintenance facilities.

REPAIR, MAINTENANCE AND OPERATING COST

Annual estimated maintenance and operating costs of intercity trains are Rs.61.920 and 71.280 million respectively for the year 1996-97 based on Railway annual accounts 1994-95. These costs have been assumed to remain the same like train fares which have also been frozen like-wise. Any increase in maintenance and operating costs will be charged directly to train fares in future to maintain present I.R.R.

LABOUR CHARGES

Total labour cost for manufacturing of coaches for high speed intercity trains has been calculated for 1996-97, which has also been escalated @ 6.5 % per year as per Planning Commission formula as given below:

	(Rs. in Million)
1997-98	132.789
1998-99	139.356
Total:	272.145

BENEFITS (EARNINGS)

Earnings have been based on 20 % above present day fare rates being charged. Therefore, earning for Intercity trains will be Rs. 932.487 million per year. The 94 % of this earning (Rs.876.538 million) is attributed to intercity trains on the basis of investment ratio on other element of infrastructure i.e. track and signaling etc. The train fares have been assumed to be frozen like operating and maintenance costs.

RESULT OF FINANCIAL ANALYSIS

Net earning has been discounted at the rate of 12 % to work out their present worth. Commulative present worth of benefit are as:

	(Rs. in Million)	
	Financial Analysis	Economic Analysis
	1456.036	2598.018
I.R.R.	17.706 %	

CONCLUSION

Salient features of rail journey compared to other modes of surface transport are safety, comfort and speed which should be provided to the passengers at affordable price. Fast growing population of Pakistan specially of bigger cities have made it a necessity of everyday life to plan the transport needs of the country in such a manner that a common man can confidently travel from one place to another within a minimum time and the fare should also be within his reach for a reasonable level of comfort. Critical appraisal of the problem would show the Railway is an undertaking whose marginal costs do not increase with the volume of traffic and its average cost is rather decrease unlike road costs which are practically independent of the volume of traffic. Simultaneously Railway is capable of expanding continuously and is therefore, of advantage to maintain traffic at an adequate level to ensure low cost per Passenger Kilometer. Rail and wheel resistance is much less as compared to road and enables multiple train units for mass movement of traffic in bulk. This

is a great technical advantage in favour of Railways despite little heavier initial cost for the infrastructure and rolling stock.

Prior to the industrial revolution the transportation problems were not so serious because of non-awareness about the value of time. Mechanical development, however, provided engines for propulsion, better material for vehicles, ships and better surfaces both rail/road for vehicle use in traveling on land and reduced the physical difficulties of travel. The difficulty of transportation became no longer how to overcome but how to thread through masses of people and vehicles quickly and safely. In the relative scale of difficulties facing men, the physical problem was greatly diminished and partly as a result to this success the more serious transportation difficulties became the conflict between & among people. The conflicts between people take variety of forms such as accidents, delay and contrasts between the traveling public and site based populations, conflict of speed and conflict of space etc. These conflicts are going to become more intense due to increase of population as well as increase of speed. The technical task of the present, therefore, is how to organize things so as to reduce the present & future conflict. The proposal of introduction of fast intercity trains in Pakistan is the best and the only solution to overcome the ever growing problems of Railways and the results of financial analysis shows that it is economically viable preposition.

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