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URBAN PASSENGER TRANSPORTATION -

THE NEED FOR HCVs (HIGH CAPACITY VEHICLES)

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INTRODUCTION

The Urban Passenger Transport Sector in Pakistan is characterized by a high growth in private vehicle use (Cars and Motorcycles), reliance on small public transport vehicles (wagons), lack of investment in large size buses and under investment in urban infrastructure. This has resulted in increasing the congestion problem in the urban cities. With the dissolution of Road Transport Corporations, the need to encourage the introduction of private Urban Buses in major cities of Pakistan has become all the more pressing. This calls for modal shift in favour of high capacity vehicles (HCVs) in our urban cities.

MASS TRANSIT SYSTEMS

The search for 'capacity' in a public transport system viz a 'mass transit system' would clearly reveal that it is motivated by a desire to find the cheapest transport service, yet the current available rail-based systems are highly capital intensive not only in terms of the capital costs of infrastructure and rolling stock but are also a perennial drain in the form of huge subsidies towards meeting the operating costs. This can be seen from the ratio of operating revenue to total cost in the case of Rail Transit Systems in some of the developed/developing countries of the world in Table-1. Besides specialized O&M skills, huge capital has to be tied in maintaining an adequate inventory of spare parts.

Table-1 RAIL SERVICE - OPERATING REVENUE TO TOTAL COST

S.NO:	CITY	SYSTEM LENGTH (Kms.)	OPERATING REVENUE/TOTAL COST * (%)
1.	Beijing	40.0	13
2.	Seoul	116.5	34
3.	Chicago	176.8	16
4.	London	408.0	46
5.	New York	369.0	25
6.	Osaka	94.1	54
7.	San Francisco	115.0	17
8.	Toronto	54.4	51
9.	Washington	103.0	20

Source:- World Bank.

* Total cost includes operating costs, depreciation and interest charges.

An examination of the urban mass transit systems requiri dedicated infrastructure reveals the following :-

(1) Traffic problems of any large metropolitan city are spread over a number of corridors and therefore construction of a small link of few Kms along any one particular artery can obviously not provide effective relief to the remaining areas. Experience has shown that for a large metropolitan city, the minimum network required to have an appreciable impact is of the order of approximately 100 kilometers.

(2) The average capital cost of a basic Subway is around one hundred million US dollars (Table-2). This is colossal for a country like Pakistan where the total annual development budgetary resources are in the neighbourhood of Rs 100 billion for all sectors including health, education, agriculture etc.

TABLE-2 CAPITAL COST OF TYPICAL METRO RAIL SYSTEMS

CITY	(US $ MILLION) PER KM
HONG KONG	112
NAGOYA	113
SAO PAULO	96
BAGHDAD	82
CALCUTTA	67
CARACAS	117
SINGAPORE	70

(3) There is hardly any Subway system in the world including London and New York which is meeting its full operating costs. The shortfalls are more than 50 - 70 per cent. This means three things namely :-

(a) The capital investment cannot be recovered and has be considered as a sunk cost.

(b) The total annual operating expenses of even a limited Rapid Transit System (RTS) of about 90 Km, as determined in the Karachi Mass Transit Study were estimated at about Rs 8 billion entailing annual subsidy of Rs 5.4 billion (about 100 times more than the subsidy provided to the defunct Karachi Transport Corporation (KTC).

(c) Even with 50% subsidy, the tariff level of the RTS, as determined in Karachi Mass Transit Study, was Rs 0.28 per passenger Km compared to the then bus fares of Rs 0.10 per passenger Km. This clearly means that fare for RTS had to be increased by approximately 200 per cent above the existing bus fares which would not be affordable by a large group of commuters.

(4) There is no proof of a Subway system eliminating the problem of surface congestion on its own.

(5) The provision of even an extensive network of Subway does not do away with buses, which still remain a very important mode of any large urban transport system. For example London Buses numbering more than 5,000 carried almost 23 percent of passenger traffic as compared to 18 percent by their very extensive subway system.

It is clear from the preceding that the current rail - based mass transit technologies require their own dedicated infrastructure, purpose - built rolling stock and require a critical length of the system network which is typically of the order of about 100 Kms for a city like Karachi if proper benefits are to be reaped in terms of minimum number

of modal changes and for adequately meeting the travel requir between the various origins and destinations. The acute shortage of urban land invariably leads to the adoption of an 'underground' or 'overhead' system resulting in a huge increase in the capital cost of the infrastructure. The location, number and distances between the 'Stops' deserve great attention at the design stage in a grade separated underground or an overhead system and once constructed cannot be changed without incurring huge capital outlays. The major factor influencing the capital cost is the degree of vertical segregation and typical per Km cost of a rail-line is as follows :-

-	At grade	$	.8	-	27 Million
-	Elevated	$	23	-	60 Million
-	Mainly Underground	$	50	-	167 Million

It may be of interest to point out that in the case of Karachi Mass Transit System, the unit cost of a Busway was estimated at Rs 159.57 million/km at the 1989 prices and for a network of 87 Kms amounted to Rs 13,882.6 million. For Lahore, the unit cost of a light Rail Transit System was estimated at Rs 477.19 million per km with the total cost for a length of 12.5 Kms in the neighbourhood of Rs 6 billion.

These huge capital investments have to be seen in the light of the fact that the modal shift from personalized modes of transport like car, motorcycle, etc is practically very little. Experience has shown that the road space made available by a mass transit system operating on a dedicated infrastructure is only of a very 'short - life' and quickly 'fills up' with new generated traffic leaving traffic congestion much as before. Only when traffic restraint policies are implemented that traffic congestion, which is mainly caused by personal modes of transport, can be effectively reduced.

Among the mass transit systems, buses are the most cost-effective and flexible mode capable of meeting demand for urban transport at various levels of quality and quantity making use of the existing road

infrastructure. This can be seen from the comparative statement of various mass transit characteristics in Table-3.

Table-3 MASS TRANSIT CHARACTERISTICS

CHARACTERISTICS	BUSES AND TROLY BUSES			TRAMS (MIXED TRAFFIC)	LRT (SURFACE EXCLUSIVE)	RAPID RAIL		
	MIXED TRAFFIC	BUS ONLY LANES	SEGREGATED BUSWAYS			SURFACE	ELEVATED	UNDER-GROUND
VEHICLE CAPACITY	80 to 120	80 to 120	120	100 to 200	200 to 300	300 to 375	300 to 375	300 to 375
LANE/TRACK CAPACITY (PASSENGERS PER HOUR)	10,000 to 15,000	15,000 to 20,000	30,000	6,000 to 12,000	20,000 to 36,000	50,000	70,000	70,000
JOURNEY SPEED (KM. PER HOUR)	10 to 12	15 to 18	15 to 30	10 to 12	15 to 25	30 to 35	30 to 35	30 to 35
CAPITAL COST (US $ MILLION PER KM.)	-	-	2 to 7	3 to 5	6 to 10	20 to 25	45 to 55	85 to 10

The findings of Karachi Mass Transit Study may be seen in Table-4.

TABLE-4 KMTS - KARACHI MASS TRANSIT ALTERNATIVES

ALTERNATIVE	CAPITAL COST (RS BILLION)	B:C	I.R.R
BUSES	9.7	3.11	49.8
COMMUTER RAIL	13.3	1.03	12.5
BUSWAYS	16.2	1.54	20.2
LIGHT RAIL	30.2	0.39	1.9
HEAVY RAIL	101.8	0.10	2.0

The rail-based systems are highly capital intensive and need dedicated infrastructure invariably. Besides, only when traffic restraint policies are implemented in the presence of an acceptable and affordable public transport system, that modal shift in favour of High Capacity Vehicles (HCVs) can be expected and traffic congestion which is mainly caused by personal modes of transport, can be effectively reduced. This can be readily seen from Tables - 5 & 6.

TABLE-5 PERSONS TRAVELLING AND ROAD CAPACITY

Vehicle Type	Persons Travelling	(In Percent) Road Capacity Usage
Motor/Bi-cycles	20.1	16.1
Rickshaw	4.4	14
Car	10.5	42.4
Taxi	1.2	5.4
Mini-Bus	17.5	6.2
Bus	45.5	11.1
Other	0.8	4.8
Total:-	100	100

Please Note:

- Road Usage with Present Fleet Mix 100%
- If no Buses 220%
- If all Buses 25%

Table-6 ROAD CAPACITY USAGE PER PERSON
(PCUs PER PERSON)

Vehicle Type	Road Capacity Usage Per Person	Relative Index
Bus	0.045	1
Mini-Bus	0.075	1.7
Motor/Bicycle	0.11	2.4
Rickshaw	0.44	10
Car	0.56	12.4
Taxi	0.61	13.6

SEQUENCE OF ACTIVITIES

It may be seen from the preceding paras that for urban passenger transportation, the sequence of activities should be to first of all provide an adequate number of buses specially on the main corridors, assign bus priority, introduce parking controls and other 'restraint measures' on personal modes of transport before going for the highly capital intensive option of an underground or an overhead system.

In this paper, we would define a HCV as a typical 45 + seater bus which has a carrying capacity of about 80 passengers (including 35 standing).

URBAN BUS TRANSPORT

There are a number of unique characteristics of an urban bus transport system which include the following :-

(1) Load Factor: There are very high but short duration morning and evening peaks with uni-directional flow (traffic moving into city in the morning and out of city in the evening). The fleet size has to be a compromise solution so that the overall load factor does not fall below 50 per cent.

(2) Capital Intensive Investment: The transport vehicles as well as their operation is highly capital intensive. A 80-passenger bus costs about Rs 2.4 million. For a fleet size of 50 buses, an investment of Rs 120 million is required for buses alone.

(3) Fare level: The urban transport is generally used by the low income segment of the society who are not in a position to pay the full cost of the services. As such raising the fares to cover total cost is not practicable.

(4) Un-remunerative routes: The Government as part of its social responsibility have to provide transport to serve areas not justified on the basis of traffic.

BUS SUSTAINABILITY

As a result, it may be seen from Table-7 that operating revenue from fare box is only a fraction of the total cost. Thus the sustainability of private urban bus operations is the most crucial question and calls for finding ways and means to address this fundamental issue effectively.

Table - 7 BUS SERVICES - OPERATING REVENUE TO TOTAL COST

S.NO.	CITY	NUMBER OF BUSES	OPERATING REVENUE/ TOTAL COST (%)*
1.	Accra	44	51
2.	Addis Ababa	164	67
3.	Ankara	899	48
4.	Bombay	2325	77
5.	Cairo	2454	50
6.	Calcutta	981	45
7.	Sao Paulo	2631	41
8.	Athens	1768	34
9.	Berlin	1505	51
10.	Chicago	2275	52
11.	London	4901	48
12.	Paris	4005	37

* Total cost includes operating cost, depreciation and interest charges.

For sustainability of the Bus Service, it is extremely important that all the stake holders namely the Government, the Bus Investor / Operator, and the users are satisfied with the returns and service quality provided by the system.

The primary role of the Government is to act as a facilitator for the investor/operator, ensure protection of public welfare and set standards. A congenial environment need to be created that allows and assures adequate and efficient bus service to the public at affordable

rates. This would mean pursuing a consistent set of policy measures and fulfilling various obligations as per the Agreement with the investor / operator over the time frame of the Agreement.

The investor / operator should be a good manager with ability to organize, manage and operate the bus fleet. Creation of a corporate structure with a minimum holding of 25 urban buses, adequate monitoring, maintenance and detailed operational and financial statistics would be necessary for the day to day working and overall proformance evaluation of the system. This information would be necessary to justify their case for obtaining adequate incentives from the Government.

A distinction between a high quality bus and a high quality bus service is very essential. An air-conditioned bus is a high quality bus in physical terms only but certainly not a high quality bus service unless the elements of a high quality bus service are fully met. High quality urban bus service would entail easy accessibility, scheduled operations, service reliability, affordable fares, safety and seat-by-seat travel. There should be a provision for premium fares for high quality urban bus services as is already available in the case of intercity operations.

No Urban Bus system is sustainable specially on secondary and tertiary routes which form the bulk of routes in any urban city. For ensuring sustainability, there is a need to devise well-directed financial support in the form of subsidy which should be given by the Government.

The requirement of equivalent number of urban buses for 10 major cities of Pakistan has been estimated at 13,300 as may be seen in Table No: 8.

TABLE-8 **REQUIREMENT OF URBAN BUSES**

S.NO.	CITIES	POPULATION 1981	1998	ACGR 1981-98	POPULATION (Million) 2000	EQUIVALENT BUSES REQUIRED (80-Pass.)
A.	PUNJAB					
	1 Lahore	2.953	5.064	3.22	5.395	3240
	2 Faisalabad	1.104	1.977	3.48	2.117	827
	3 Rawalpindi	0.795	1.406	3.41	1.504	552
	4 Islamabad	0.204	0.525	5.70	0.587	197
	5 Multan	0.732	1.182	2.86	1.251	448
	6 Gujranwala	0.601	1.125	3.75	1.210	431
	Sub-Total (A)	6.389	11.279	3.40	12.064	5695
B.	SIND					
	1 Karachi	5.208	9.269	3.45	9.920	6613
	2 Hyderabad	0.752	1.151	2.54	1.210	431
	Sub-Total (B)	5.960	10.420	2.93	11.130	7044
C.	NWFP					
	1 Peshawar	0.566	0.988	3.33	1.034	362
	Sub-Total (C)	0.566	0.988	3.33	1.034	362
D.	BALUCHISTAN					
	1 Quetta	0.286	0.560	4.04	0.606	204
	Sub-Total (D)	0.286	0.560	4.04	0.606	204
	Total (A,B,C & D)	13.201	23.248	3.39	24.834	13306

The annual average number of buses produced locally is about 750 as may be seen from Table No: 9. This means that even for phased induction, import of buses may be necessary and the possibility of allowing reconditioned urban buses may be given a serious consideration to minimize the investment requirement.

TABLE-9 LOCAL PRODUCTION OF BUSES

YEAR	BUSES
1990-91	826
1991-92	1,114
1992-93	1,177
1993-94	427
1994-95	312
1995-96	438
1996-97	862
1997-98	425
1998-99	1,220
Annual Average	750

PACKAGE OF INCENTIVES

The Package of incentives for facilitating financial viability of urban buses should include the following :-

(1) Credit facility: To encourage urban bus transport, adequate finances should be made available. For this creation of a special credit line at low rate of interest may be considered by the Banks. The Government should however not extend any guarantees for obtaining loan by the private urban bus transport investor/ operator.

(2) Income Tax Holiday: To make this venture attractive and profitable and to help in maintaining affordable bus fares, income tax holiday may be granted.

(3) Import Duty and Sales Tax Exemptions: At present the Import Duty and Sales Tax constitute about 30-35 per cent of the C.I.F price of buses. Exemption of Import duty and Sales Tax on urban buses and spare parts will reduce the total cost. This reduction will be reflected in the increased profitability of the operator and also reduced burden on the users in the form of lower fares.

The possibility of importing re-conditioned urban buses may be given a serious consideration to augment the supply of buses at minimum cost.

(4) Bus Terminals: Urban land is very expensive. An important component specially for urban transportation is the provision of a suitable location for terminals, which may require government assistance by providing suitable terminal facilities on direct repayment or leased basis to a group / association of operators. Alternatively operators may pay a nominal monthly or daily fee depending on usage. Depots, together with maintenance and servicing facilities need also to be provided in a similar manner. The facilities of the defunct Road Transport Corporations should be reserved for urban bus transport operators on suitable terms and conditions with the clear cut proviso that the land-use will not be altered in any way.

(5) Financial Support: Since no urban bus system is sustainable specially an secondary and tertiary routes,

there is a need to devise well-directed financial support in the form of subsidy which should be given by the Government.

(6) Bus Franchise: Rather than individual transporters, corporate sector in the form of companies, firms and groups with a minimum fleet of 25 urban buses would be necessary. In a franchised system where exclusivity of operation has been granted to an operator on a particular route, it would be advisable to prescribe the minimum and maximum fares depending on the quality of service. However, on routes being operated by more than one operator, deregulation of fares may be allowed. Provision should be made for premium fares for high quality urban bus services as is already available in the case of intercity operations with subsequent inflationary adjustments in input costs.

(7) Bus Priority and Restraint: Measures: Depending on the congestion, phasewise introduction of bus priority schemes and restraint measures on personalized modes of transport (temporal, spatial, fiscal, etc) may be introduced on the major corridors.

(8) Bus Bays and Bus Stops: It is extremely important to use the bus bays and bus stops for the minimum time to ensure safe embarking and disembarking of passengers only. This is important for maintenance of laid down bus schedules.

In order to encourage urban bus transport, the above package of incentives should be available only for urban buses.

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