

Paper No. 480

Transport options for developing countries

By

ENGR. GHAS-UD-DIN
B.Sc. (Engg.) ; M.I.E. (Pak.)
Overseas Fellow E.D.I. (World Bank)
General Manager
Pakistan Railways, Lahore

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SYNOPSIS

Advent of civilization, its development and its progress owe in entirety to nothing but transport and transport alone. The speedier and economical vis-a-vis accident free the transport, the greater the pace of development of a nation. Inland transport comprises mostly of Road and Railways as Airways cater hardly for one half per cent of the entire population which represent the elite only. Of the Road and Railways the latter is speedier and most economical, haulage costwise, thanks to its negligible friction between rail and wheel in comparison with the former. In terms of safety and comfort the Railways have no parallel. Direct costs of Road transport remain static irrespective of length of haul. But the Railways register marked decrease in costs of operation with the increase of lead. Space and frequency wise the Railways are the only answer when it comes to moving hundreds of thousands of commuters in urban areas to and fro in given rush hours. Though costly to lay and maintain the railway track offers better returns with longer life span of productivity. However, the road vehicles being smaller units and free to move and reach nooks and corners of the country have their own advantage. The need, therefore, for developing countries is to formulate integrated master transport plans assigning appropriate share of traffic to either of these two modes. That is to say the Railways should lift major and bulk traffic over long hauls on trunk lines for distances of over 250 to 300 KMs and roads should take on the complementary role of connecting rail heads and for lifting shorter lead traffic. Than to enter an unhealthy competition of vying for the same traffic the master plan would earmark areas of operation for various modes of transport providing and developing for them the necessary infrastructure for the overall development of the economy of a country. The author has discussed the necessary parameters of both the modes to bring his point home.

1. Significance of Transport Within the National Economy:

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 all encompassing entity which has its inalienable and in-bred 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 so to its very 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. To illustrate 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 and in export and import trade. It is also the only element which by overcoming geographical and physical barriers promotes socio-economical contacts between various communities of a nation thus fostering better understanding for the overall national unity. It helps successful implementation of health and education programmes and provides necessities of life in abundance in every nook and corner of the country and that too at competitive prices.

* B.Sc. C.E. (Punjab), M.I.E. (Pak), Overseas Fellow E.D.I. (World Bank) M. E. C. (Pak)
General Manager, Pakistan Railways.

2. Basic Philosophy for Transport Planning:

Transport is closely inter-related with and is inter-dependent on other sectors of the industry which are the components of GDP and GNP. As it is, identification of the potentials of developments in terms of macro and regional economics of the country is made by projections of GDP i.e. production vis-a-vis population in accordance with the projected time/framework based on the analysis of the past development trend of the major commodities zone-wise. Then the surplus/deficit analysis of the major commodities for above time/framework is made in terms of volumes of cargo and passengers to be moved based on the analysis of production/consumption and export/import. The outcome of these projections and analysis is to be used for determination of co-relations between various traffic volumes to be projected.

3. Objectives of Transport Planning:

The main objective of Transport Planning is that implementation of the plan should not only contribute to the sound, steady and safe movement of goods and persons, but also, to the economic growth directly. It should cater for achieving a higher rate of production and per capita income. It should provide for creation of new markets and promotion of existing ones. It should be able to transport agricultural commodities and facilitate social contacts and educational activities amongst various communities.

It is, therefore, necessary to make a careful determination of the exact share of national resources that should be devoted to Transport development in order to accomplish the desired goals set forth by the projected transport needs in keeping with the policy and strategy to be adopted. Since transport planning has to deal with existing resources as well as those which would become available in future, the approach shall have to be as to how best the available facilities can be used most efficiently and how investment in additional facilities could be made with a minimum use of resources while satisfying planned objectives to the maximum.

4. Notions about Overall Development Policy:

Overall transport development policy and strategy in the projected time/framework shall inter-alia include the following aspects:

- i) Integrated development of different modes of transport according to the economical modal distribution of traffic.
- ii) Transport system to be so developed as to encourage the increase of production and commercial activities, and to contribute to economic development of the country.
- iii) Development of Transport system to be aimed at opening up of the backward areas hitherto unapproached by any transport mode.
- iv) Transport capacity of the existing facilities and equipment to be fully utilised by elimination of bottlenecks and by optimisation of their performance efficiency.
- v) Only those new projects which have a sufficient economic viability or higher importance from the viewpoint of national integration to be implemented.

- vi) More private investment to be encouraged in transport sector to stimulate the transport activities and to assuage the resource constraints in the public sector.
- vii) For lifting major share of the total traffic to be expected between the farthestmost points of economic importance, the activity and the transport capacity of the viable mode on the national and international traffic corridors to be substantially improved.
- viii) Transport facility at the international terminals to be substantially developed.
- ix) Comprehensive measures for planned and progressive introduction of modern transport techniques such as Containerization, unitisation, palletization and piggyback to be developed in close coordination amongst various transport modes such as Shipping, Ports, Railways, Roads, Road Transport and Airways.

Concept of Action Plan and its Implementation:

The entire Transport sector will be developed on an integrated planning policy cum strategy known as Transport Master Plan oriented on a given Time cum Resource framework duly dovetailing yearly and five yearly plans. The basic concept for formation of the Master Plan is that implementation of the Plan should not only contribute to the speedy and safe movement of goods and passengers but also directly stimulate the socio-economic development of the country. In consideration of the various constraints, the first approach to the Master Plan shall be the planning as to how available facilities can be used most efficiently and the second how investment in additional facilities shall be made within minimum available resources while satisfying the planned objectives fully.

Strategy and Policy:

The outstanding policies for development of national transport system are described below:

- 1) The national transport system of the country shall sufficiently cater for the domestic and international traffic demands in passenger and goods movements as a whole commensurate with the international quality standards. In other words, each mode of transport shall have enough capacity to meet with respective traffic demand and there would be no bottlenecks in the linkage between the different modes of transport.
- 2) The priority of investment in transport sector shall be given to those projects which have higher and quicker economic returns. However, investment in backward and/or isolated areas shall be made from the basic humanitarian considerations and national integration view point alone.
- 3) In consideration of the geographical characteristics of the country and transport economy, railways shall have major responsibility to the long distance haul of freight and passenger transport.

7. Master Plan:

The specific policies and strategies in the national transport Master Plan worked out on the basis of the above are as under:

- i) The modal distribution of future traffic shall be made on the basis of suitability of Transport and relative cost.
- ii) Minimisation of the total transport costs shall be aimed at by integrated development of different modes of transport.
- iii) Transport system shall be so developed as to encourage and increase production and commercial activities.
- iv) The transport capacity of existing facilities and equipments shall be fully utilised by elimination of their bottlenecks and by optimization of their performance efficiency.
- v) More private sector investment shall be introduced into transport sector to maximise the transport activities.
- vi) Balanced National Rail and Highway networks shall be established by rationalising the existing networks.
- vii) Comprehensive measures for introduction of modern techniques of containerisation, unitization, palletisation and piggyback shall be developed in effective coordination amongst shipping, ports, railways, roads and road transport on the one hand and Producer Industry on the other.
- viii) Serious bottlenecks in respect of capacity and safety at major airports shall be removed on the highest priority to secure a smooth operation of international and domestic air traffic.

8. Mechanism cum Time Orientation of Master Plan:

Viable undertaking of Master Plan in transport sector is to formulate the comprehensive transport system over 15 – 25 years span. Construction of new transport facilities and upgrading/improvement of existing ones are the main objectives which are required to establish effective linkage between the different modes. *It is now appropriately suggested that the overall transport system has to be established, not on the project base independently but by bringing it in line with the proposed Master Plan.* After execution of the total Master Plan, the transport system of the country shall offer the ideal service level in capacity and in quality which would adequately contribute to the economic activity of the country. Location, timing and forum are the important items to be identified in the Master Plan making. Other necessary factors to be considered are as follows:—

- i) Harmonising with the future land use plan.
- ii) Comparison with the alternatives, based on the different forecasts fundamentally initiated by the land use plans.
- iii) The impact of on-going short and medium term projects.

9. Plight of Major Transport modes in the Developing Countries:

Roads and Railways are main surface transport modes in the developing countries of Asian and African regions. The existing road and bridge networks, their standards and maintenance, are far from satisfactory to offer the appropriate service level and are not fit in general for the large size vehicles in spite of concerted efforts to improve the same in some countries such as Indonesia, Thailand and Malaysia etc. Efforts in this direction in some of the West Asian oil producing Gulf States, Iraq and Iran have succeeded to some extent but much is yet left to be done. On the other hand, in case of railways, the development effort has practically been negligible due perhaps to managerial and technological deficiencies. The development efforts have so far been confined to minor rehabilitation and maintenance after the second World War. In actual terms no real technological change has occurred in the realms of sophisticated signalling/telecommunication systems, modernisation of their maintenance facilities, Electric Traction and enhancement of system capacity. It hardly needs to be mentioned that modern railway technologies in the different railway fields are nothing short of space technologies. It can be safely concluded that railways in the developing countries of African and Asian regions, barring a few exceptions like Indian Railways, have not played their role as a mass rapid transport mode. Thus Transport infrastructure in the fields of road and railway transports have to be developed in a complementary manner based on their inherent capabilities keeping in view of course the socio-economic environment of each and every country. Since air transport practically serves only one half or even lesser percentage of population, the choice of developing a mass transport system remains confined to roads and railways. Their peculiarities and characteristics are discussed individually hereafter to arrive at the best choice or option in the context of socio-economic and technological environment prevailing in each and every country with the attendant constraints.

10. 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 trains 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 lowest.

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. Rail-

way is capable of continuous expansion. It is, therefore, of advantage to maintain traffic at an adequate level to ensure low cost per tonne-kilometre. Given an adequate level of traffic the cost per tonne-kilometre can only be beaten by barge services operating over major national waterways or by major pipelines.

11. Roads/Highways/Road Transport:

Road is characterised by the use of separate vehicle having a small unit capacity with an extremely high power-to-weight ratio. Road vehicles can easily be placed in service and are independent of any time table; are able to stop where they wish and within short distance and can easily run to the doors of houses or inside commercial undertakings (door to door transport). They are flexible in use and the personalised nature of the service which they provide offers an indisputable attraction to the users. Their network is as intense as the public Highways. The cost per tonne-kilometre for drivers and fuel is high and the average cost decrease with the increase of distance is much lesser than that of the Railways. On an average, the costs are lesser than those of the Railway only over short distance (up to about 250 Kilometres).

Road transport, however, has given rise to serious problems with regard to congestions and safety. Heavy road transport (more than 4-tonne axle load) demands costly strengthening of the road – relative road wear is a function of the fourth power of the ratio of axle-loadings. This means that virtually the whole of road 'wear and tear' maintenance costs should be attributed to heavy vehicles. Besides, Road Transport causes noise, vibration, visual intrusion, atmospheric pollution and frequent high number of accidents.

12. Parametric comparison between Roads and Railways:

It will be a valid proposition to do comparison between Road and Railway transport based on the following parameters so as to assess their viability suiting the national environment of socio-economic and technical constraints. The parameters universally recognised are as under:—

- i) Energy consumption.
- ii) Economics.
- iii) Speed.
- iv) Comfort including safety and frequency.

The detailed analysis parameter-wise is as under:—

i) Energy Consumption

- The Railway is a mode of transport characterised by low energy consumption. An air traveller consumes 3 to 10 times more fuel than a passenger travelling in an express train.
- Motor car consumes 2 to 5 times more petrol than the equivalent quantity of energy required by a fast intercity train. In urban and suburban areas, motor cars consume 2 to 10 times more petrol than an equivalent quantity of energy consumed by sub-

urban trains to provide the same transport facilities.

Energy consumption of the Railway is generally 4 to 6 times lesser than that of the heavy road lorries carrying the same volume of traffic.

The Railways have considerable advantage in regard to the adaptable use of power such as solid fuel, liquid fuel or electric traction vis-a-vis their economical employment.

ii) Economics

- a) Economically the railways in the developing countries are the cheapest mode of transport beyond a certain length which in the case of Pakistan is about 300 kilometres. Upto 300 kilometres road transport is viable and beyond that distance railways are more economical. This limit may vary from country to country. Ton-kilometre costwise, railways are much cheaper. In Pakistan, cost of transport by rail per ton-kilometre is about Rs.0.20 against that of about Rs. 0.60 by road. Thus the advantages of rail transport over road transport are quite predominant.
- b) There is another aspect which is that of space utilization. If there is a movement of persons to and fro between points A to B and the number of such moving persons to and fro is twenty thousand per hour then no satisfactory/viable road transport system can be designed to cater for this traffic. Even if one such road transport system has to be created then four hundred feet wide modern highway/roadway will have to be built for plying of Buses speed of which will be around 5 to 10 KMH the most. Against this the most modern driverless railway would comprise one up line and one down line with the land width reservation of 30 ft. only in the case of Board Gauge. This railway line will cater for to and fro movement of one hundred thousand persons per hour between the two points. The frequency of train will be of the order of a train every minute in each direction or even lesser. The system will be Automatic Train Operation (ATO) dispensing with Driver even. The speed of such a train would be 60 to 100 KMH.

iii) Speed

Very high speeds over long distances can be sustained in the case of railway transport. The highest commercial passenger and freight train speeds prevalent on modern railway system in France, Japan, West Germany and U.K. are of the order of 300 KMH & 140 KMH respectively. 300 KMH is practically an air speed. TGV of France is operated hourly between Paris and Lyon at 300 KMH. No road transport has yet been designed/devised to operate at these speeds

iv) Comfort, Safety & Frequency

All the railway systems in the world are designed and built to meet strict standards/specifications prescribed for the comfort/safety of passengers and goods as well. The prescribed comfort and safety parameters, tolerances and limits are based on actual

research, tests, trials and experimentation on human beings. The road, air and sea transport systems have yet to come up to standards/specifications as have been closely followed by the railways since their inception in 1845 or so. Roads and Highways all over the world are becoming Death Traps and grave-yards as far as human life is concerned. So is the case in Pakistan. Frequency of Train can be 30 second and upward with practically 100% safety.

13. Inevitable Option.

From the foregoing discussion especially elaborated in paras 10 to 12, it is crystal clear that the obvious and inevitable option available to the developing countries is that of Development of Railways suitably and adequately supplemented/complemented by the properly designed/merged road systems. Ultimately the optimum solution lies in the adoption of a MULTIMODAL MIX with predominance of Railways in the long distance and bulk hauls adequately supplemented by reliable road systems up to distances of 300 KM or so. Waterways and coastal shipping may also fill in the gaps if peculiar environmental situations so warrant. The air transport should be developed for international travel but only as an elite luxury transport within the country.

14. Related Aspects incidental to the development of a Multimodal Mix of Efficient Transport System:

The transport expert and planner cannot afford to ignore or overlook certain pertinent aspects mostly in the Realm of Management and Management Science techniques which impinge vastly in the creation, management and maintenance of an effective and viable transport system. Some of these aspects are described hereunder for the information of Transport planners and designers:—

i) Application of Technology to Transport System:

It may be noted that technology has not been included as one of the parameters in the above discussion. Technology, as available in the prevailing state of Art, should be applied to achieve the ends of progress in the field of transport. The developments achieved by the scientists and the technologists should be adapted to improve the transport systems but the professionals in the transport world should also develop new concepts which should be communicated to the scientists and technologists for transforming them into practical shape. If we look into the history of technological progress, we will find that best advancements were made when the user posed the demand upon the scientist and the technologist. So effective communication between the transport professional and the Scientist or the technologist is essential to ensure optimisation of application of modern technology towards progress in the transport sector which recourse is bound to produce better results.

ii) Human Attitude

Another factor which merits discussion is "Human Attitude". Even in the world of today which is highly scientific and computerised, human beings continue to remain the most important link. It is the people involved in a certain field who according to their personal attitude influence the pace of progress and become in-

strumental for a change in their respective sector. People who are conservative and lack mental flexibility to comprehend the dimensions of progress will always support status quo which in a fast changing world of today is as bad as retrogression. Now a days even with progressive attitudes it is difficult to keep abreast of the latest developments. People who are hesitant to accept the change and fail to adapt new methods are not going to maintain even status quo but will rather end with a retrogression. The policy makers as well as professionals in the field of transport should, therefore, be very careful that they themselves, due to their conditioned mind, linkages with the past and aversion to new ideas, may not become the biggest impediment in appreciating the new realities of the changed environments and lag behind in adapting themselves to the changing trends in transport.

iii) **Concept of Integrated Transport System**

It has already been elaborated that in modern times we cannot afford to consider various modes of transport individually. With a view to achieving economy and efficiency, each mode of transport should be developed as a part of the total integrated system and should be inter-knit with each other.

iv) **Coordination at the National and Regional Levels**

As a sequel to the concept of Integrated Transport System, it is imperative that transport development within a country is progressed with close coordination amongst all concerned Organisations and Authorities at the national and the regional levels. The objective is not to over-centralise but to coordinate at the policy formulation level. Objective planning and development with flexibility to accommodate the needs of other sectors should be the hall-mark.

v) **Prejudices**

Subjective parochial approach which commonly prevail amongst the policy makers in the developing countries must be guarded against when dealing with developments in transport. A pragmatic and enlightened approach is the answer to this problem. Some very surprising incidents have taken place in developing countries. On one occasion a group of experienced port management officials were against the development of another Port in their very country merely because of myopic and short sighted subjective approach on their part. Contrary to this many developed countries of very small size have two independent ports functioning side by side located on either bank of the same river or water-way. In Pakistan some think only one port was enough while others think that even more than two ports would be advisable. Realistically speaking a country can have as many ports as it has the capacity to develop as all ports of a country function in a complementary manner to support the national economy. Ports of a nation do not compete with each other but they complement each other in meeting the needs of the national and international trade and in furthering the economic development of the nation.

vi) **Use of Consultants and Advisors**

Developing countries find themselves at a handicap to conceive, plan and implement various projects without the help of the advisors and consultants from the developed countries who have the necessary expertise and technological know-how. There is a very noble trend amongst the nations of the world today to help each other. Indeed it has great advantages and benefits for the developing countries. However, these experts render advice which is based on the experience of their own country and may not totally apply to the developing countries. In view of the changed environment it may necessitate certain modifications in the foreign consultants' advice to optimise gains. Therefore, sometimes the attitude of developing countries in accepting the advice of these consultants and advisors as the Gospel's truth may not serve the purpose and should be guarded against. Further, very close coordination and purposeful communication should be maintained with these advisors and consultants to acquaint them with the local problems and the environment so that the fruits of their experience may be applied to the best advantage in the new conditions.

vii) **Decision Making Process**

The most significant factor responsible for the slow progress in the developing countries is predominantly the slow decision making process observed by the policy makers, professionals and bureaucrats in these countries. The concerned people in the developing countries must get themselves educated in accepting the responsibility which their position demands out of them so that they may accord decisions appropriate to their levels with ease, accuracy, speed, objectivity and full consciousness of accountability. National Scenarios in developing countries are full of examples where slow speed of decision making process continues to cause loss of timely progress, without any accountability. The institution of bureaucracy have such inherent and inbuilt strength that it has virtually become immune to accountability. It is upto the individual developing countries to find the answer to this problem as best suited to their socio-economic conditions.

viii) **Inter-country Coordination**

The planning and development in all sectors of transport today has to be done in coordination with other countries of the world too. The operational capabilities of the ports and the sea, road, rail and inland transportation systems including the designing of the highways, railways, bridges, overhead and side clearances, etc. have to be planned and developed on uniform international standards and norms. Realistically speaking the countries of the world cooperating with each other have to be visualised as one entity as far as development of integrated transport system is concerned. It is in the mutual interest of both, the advanced and the developing countries, that this coordination is maintained and progressed.

ix) **Cooperation between Professionals and Scientists/Technologists***

The relevant transport professionals must develop closer communication and rapport with scientists and technologists so that adaptation and application of available state of art can be optimised in the field of transport. A good specimen of such coordination exists between the scientists/technologists and the military

professionals. This can serve as an example for the transport sector.

x) **Hope for Bright Future of Developing Countries**

The opportunities for the developing countries are in plenty and the scenario is quite optimistic but the challenges posed for them including their respective Transport Sectors are also demanding. According to Professor N. J. Noortman:—

“In 1970, the older market economies share of world wide industrial production was still running at about 70%. By the year 2000 it will probably have dropped to less than 50%. Of the world's three major industrial centres — the United States, Western Europe and Japan, it is likely that only Japan will have been able to maintain its relative share of about 8% of the total. The other side of the coin is that the developing countries with a market economy will gain in industrial significance. Their share in world wide industrial production will grow from 6% in 1970 to about 18% in the year 2000. The highest rates will be seen in the Asian Countries and Middle East followed by South Africa”.

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