FEATURES

CONSERVATION OF ENVIRONMENT, TRANSPORT AND DEVELOPMENT

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In this paper Dr. P. C. H. Ranasinghe, a Ph.D. (Cantab) and M.C.I.T. (Eng), who is a senior lecturer of the Department of Geography at the University of Colombo, maintains that decisions to invest on transport should be taken not in isolation but along with consideration of other sectors of the economy, and shoud be coordinated with urban development; and considered as a factor which encourages development, improves mobility and enchances the environment.

It is not irrational to think of transport, properly applied, as an instrument for the pursuit of National Policy objectives, particularly where great distances are a limiting factor to balanced national growth. If a country is to remain cohesive, goods and people must be moved over the distances that seperate them. It could be expected that the cost of distance would be a burdensome factor on the shoulders of the nation in the future when implementing a National Policy for development of resources, industries or regions.

It is understood that the functioning of an economy needs the use of transport and that, as economies develop, specialized production increases and relatively more transport is required. Yet transport improvements alone cannot produce economic growth, though in a suitable environment it can be the missing factor. Hence, decisions to invest on transport should be taken not in isolation but along with consideration of other sectors of the economy. Therefore, there are a few aspects to which attention (needs to be paid) when taking decisions regarding transport planning. These would include the following:

i. Transport plans should be analysed with direct relation to the general economic development plan. In particular, alternative uses of investment funds should be considered to determine the relative attractiveness of transport investments.

ii. All modes of transport should be considered together as one interacting system, and all phases of each transport mode's operation should be taken into consideration in evaluating new projects.

iii. The effects of transport plans on other sectors of the economy, whether there is direct cost or benefit to those sectors, shoud be evaluated.

iv. Within the context of the broader economic development plan, there should be a basis for evaluating different transport pricing policies.

v. An effort should be made to investigate the affects of transport on the other major independent variables such as population growth, foreign trade or even weather.

vi. Transport improvements should be co-ordinated with urban development. Transport should be considered as a factor which encourages development, improves mobility and enhances environment.

FACTORS TO BE CONSIDERED IN A CONSERVATION STRATEGY WITH REGARD TO TRANSPORT

Space

There is an interaction between transport and land utilization. Space on land is a scare resource in developed as well as in developing countries. In Sri Lanka, land is becoming a scarce resource especially in the urban areas. The expansion and development of transport systems need space — track space (roads, canals, railways, pipe—lines) and terminal space (airports, railway stations, bus stops and depots, harbours and container yards, etc.). Most of these find their space especially in the urban areas, at the expense of other amenities such as parks and open spaces, housing and business premises.

Increase in population and increase in urbanization demand a progressive widening of the roads and also transport terminals in urban areas. At the same time, the increase in population demands extra food. In rural areas. useful agricultural land may be occupied by tracks. There are no recorded instances where roads previously in use have been scrapped and the land returned to agriculture. Thus, we see a conflict in demand for land. One may, therefore, look at the alternative methods of transport which might avoid or at least delay this conflict.

It is understandable that the space needed for right of way is indeed a scarce resource. Hence, it is more sensible from the point of view of conservation to make the best use of the space already allotted for movement. Thus, presently laid railways, canals and road networks should be used to the maximum, unless their conversion or abandonment lead to conservation in other resources.

For instance, railway is economical in space and energy, and also economical in mechanical wear and tear. Canals are exceptionally economical in energy and wear.

The table below shows the relative efficiency on space of different modes of transport. Thus, it illustrates that public transport is more efficient than private transport and railway is yet more efficient on space than passenger bus.

All over the world, those who are interested in conservation and development are expressing increasing concern for rationing urban space and giving priority to those who use it sparingly and cleanly. For example, cities like Singapore and New York are restricting the use of motor cars. Thus, modern town planners and traffic engineers, whether in developed or developing countries no longer contemplate to widen the roads and

TABLE 1

Persons per foot—width per hour	Speed—mph	Persons—ph
Urban railway	30	1,700
30 passenger bus on urban street	7	550
Car with driver on urban street	10	55

Source: *Urban Transport Sector Policy Paper, World Bank.*

increase the volume of traffic flows. Instead, the planner is now seeking to control and limit the traffic flow and also to give priority to public transport which uses road space so much more economically.

The future conservation strategy should be to discourage as much as possible the use of private vehicles and to have a very efficient public transport system in order to conserve the valuable space. Whether such public transport is owned and operated by private or public sector enterprise is irrelevant to this issue.

Materials Usage in Construction and Maintenance

Here, the advantage lies with canals since the cost of water, including pumping it to higher levels and also maintenance of canal banks are not so costly. Railways on the other hand, are costly at the original construction, but given constant and careful upkeep are cheap in material. The cost of highways would vary, depending significantly on the quantity of earthfilling involved and the distance to which granite has to be transported. Thereafter, the maintenance of a highway depends largely on axel-loads and weather conditions. Although the space has been allotted and the cost of construction has been already incurred, the improvements, expansion and the maintenance of any mode of transport should be related to its resource consumption in longterm operation and maintenance.

Extension or expansion or upliftment of any existing modes or tracks of transport should not be carried out without a detailed study into all the facts and figures and the social and economic costs and benefits.

Widening and upliftment of urban and also inter-city highways in Sri Lanka could be restrained if, public (mass) transport is encouraged over private transport. The existing highway network should be operatd so as to facilitate, in the first place, the movement of public transport so that public space can be used more economically and the need to invest scarce public resources could be minimized.

Energy

In Sri Lanka, there is no comprehensive study done on the economics of energy consumption on different modes of transport. However the Sri Lanka Transport Sector Study, Friedrich - Ebert - Stiftung, 1982, gives the following figures:

TABLE II

Mode	Passenger Miles per gallon
Bus	284 - 433
Train	216 - 352
Car	46 - 50

Urban space and laid tracks are a scare resource almost in any part of the world. Petroleum based energy is also a scarce resource except in oil producing countries. On a world perspective oil is expected to be running out within 50 to 60 years. It is generally accepted that the quantity of oil required to move a ton of goods by road will move four times that tonnage by rail or by water. Where passenger transport is concerned the ratio in Sri Lanka is approximately that a private car rider consumes 10 times as much as a bus or train rider.

The chief petroleum user in Sri Lanka, is the transport sector. The factor to be considered is how far the currently practiced forms of transport are economical.

It is approriate to consider the alternative forms of transport as well as alternative sources of energy due to the following reasons: namely, scarcity of fuel, increase in price of fuel, growing dependence on petroleum imports, balance of payment deficits, foreign exchange shortages, urban congestion, noise and air pollution, increase in the accident rates, and the limited availability of funds to widen and also uplift the conditions of the present road network.

An engery policy should be formulated to lower the overall transport-energy intensiveness.

Table 3 illustrates in-bound and out-bound vehicles and estimated passengers toandfrom the city of Colombo on a normal week day betweeen 6 a.m. and 7 p.m. (Assumption: here, on number of passengers carried is SLCTB 75; Private passenger bus 32;and Car 2.)

The above table clearly demonstrates that out of the total vehicular traffic only 16% comprises SLCTB buses while they carry an estimated passenger volume of 60%. Private passenger buses though greater in number than SLCTB carry only 36% of the estimated passengers. The highest volume of vehicles is formed by motor cars in the city which comprise 55 - 62% and they carry a very limited number of passengers, 4 - 6% only.

Therefore, from the conservation point of view, it is advisable to control and limit the private motor car and also controls should be applied on private buses with smaller capabilites, especially in urban areas, particularly in the city of Colombo. More cars and more smaller capacity passenger vehicles mean less fuel economy, more road congestion, and greater consumption of time and energy on the road, more traffic hold-ups, more noise and increased air pollution, especially by petrol consuming vehicles, higher incidence of accidents and greater wear and tear of road surfaces,and also wear and tear of vehicles themselves.

To eliminate the wasteful use of energy as far as passenger transport is concerned, it is advised that private sector diesel buses with bigger capacitites and SLCTB buses should run according to a set time-table so as to prevent overlapping and wasteful competition. Encouragement should be given to public sector transport services as much as possible. The use of private carsshould be discouraged by direct as well as by indirect methods.

TABLE III

In—bound	Vehicles	%	Passengers	%
SLCTB	12,904	19	967,800	60
Private buses	17,980	26	575,360	36
Cars.	37,931	55	75,862	4
Total	68,815	100	1,619,022	100

Out—bound	Vehicles	%	Passengers	%
SLCTB	10,883	16	816,225	59
Private buses	15,208	22	486,656	35
Cars	42,078	62	84,156	6
Total	68,169	100	1,387,037	100

Complied by P. C. H. Ranasinghe, from a traffic count in March,April and May, 1983.

However, one area where the private sector can contribute in a meaningful way as far as transport is concerned, is the village sector. While bigger capacity diesel vehicles should be used in the urban sector, smaller capacity diesel vehicles should be used on village roads. Special considerations and concessions should be given to bus owners who run on village routes.

At present, 28% of the country's income is spent on oil imports (Economic Review, March 1983). Therefore, from the point of view of resource conservation, it is proposed that CGR, SLCTB and Private transporter should be integrated and have a unified and co-ordinated system of transport.

The aim in urban transport should be a restricted use of the private car, a reduction in air and noise pollution, better facilities for journeys between home and work, reduction of the traffic congestion and minimizing of investments on road building and expansion.

In rural transport our aim should be to ensure a fair level of public and private passenger transport services to facilitate the transport of people and as well as goods for those who cannot use a car or have their own form of transport.

If we can provide better public transport services to induce people to give up the use of private vehicles,then it will cuase some reduction in oil consumption and in road investment.

As far as energy conservation is concerned, use of electricity may conserve fossil fuels which in turn will conserve the environment. Thermally generated electricity may conserve fossil fuels to a certain extent as against the direct use of oil. If hydro or nuclear energy can be used, there will not be a draw on oil or coal at all. Hydro-electricity also will have added advantage of little noise, less air pollution and no soot. However, energy conservation needs correct choises both in the mode of transport and also in the form of energy.

The estate sector should make use of the railway. Even on djesel-oil, freight trains are said to be 3 or 4 times more fuel efficient than road vehicles. If we made use of electricity to run the train, it would be more favourable from the point of view of the conservation. By electrification, energy saving would be much greater, as most of the electricity in Sri Lanka can be generated through hydro sources. Even with fossil fuel thermal electricity could be generated with a better fuel efficiency at a central thermal station than on board a diesel locomotive. For passenger services too, electrification can have added advantages, especially with regard to acceleration out of station stops. A faster journey for the passengers and a better mileage output from the rolling stock and crews can be achieved by having a quicker run round. From the investment point of view electric equipment in train service is usually said to have twice the life span of equivalent diesel stock.

The recent revival of the canal system stretching from Puttalam to Kalu Ganga is a welcome sign since the canals can be used cheaply for freight transport. Canals have their inbuilt advantages such as energy conservation, labour intensity, and environmental compatibility. Moreover, they can be used as waterbodies to drain the rain water in the city. Canals should be used as much as possible to transport heavy, bulky, non-perishable goods. The canal system should be extended as far as possible.

Environment

Exhaust gases from vehicles with gasoline engines are said to contain 150-200 different compounds. Only a few have been identified as harmful. From vehicles, with gasoline engines, gases such as carbon monoxide, hydrocarbons, oxides of nitrogen and compounds which contain lead have aroused attention of most environmentalists and conservationists. Lead is regularly added to automobile gasoline in order to extract more power from the internal combustion engine, while maintaining its smooth, regular operation. After burning, about 75% of the lead is introduced into the atmosphere. However, this technique means that considerable quantities of lead are emitted to the air due to the extensive and rapid increase of road traffic. Irrifutable confirmation that lead in urban atmosphere originates from gasoline combustion is now provided by the findings of isotope analysis. It has not yet been possible to prove that lead has done harm to the Sri Lankan population, but there could be a risk of harmful effects after a long period of time or resulting from combination with the effect of other substances.

Exhaust gases from gasoline vehicles contain large amounts of carbon monoxide and are thus much more toxic than exhaust gases from vehicles with diesel engines. On the otherhand, diesel gases cause more immediate discomfort as they contain more soot as well as substances which smell bad and irritate the mucous membrane. Incorrect setting of the fuel pump is the main cause of soot formation, which can be eliminated completely. It can be believed that the problem of vehicle exhaust gases will become more severe if the trend is not arrested in time. Since the number of vehicles increase yearly, we can expect that the proportion of air pollutants especially in urban areas will increase even more steeply.

Noise is a social problem which has attracted more and more attention in recent years. Absence of noise constitutes an important part of a good environment. The majority of people experience noise as irritation, a factor which disturbs harmony and enjoyment. However, noise can also develop into a health hazard and a medical problem affecting the community. Noise can disturb personal communication. In more serious cases noise can cause direct physiological damage in the form of occupational diseases, either psychic or psychosomatic of the internal organs and blood vessels.

One of the major sources of noise in the communities of today is motor traffic, in spite of all the work that has been devoted to make more silent engines. Some vehicles' engines are practically silent and the general trend is towards quiter engines. However, traffic noise is already severe and creates increasing annoyance especially in urban areas. Tyre tread and squeal, gear grinding and body rattles also contribute to the traffic noise level. This does not depend only on the noise level of the individual vehicles but it is also due to the technically unsuitable way in which they are being used,especially in the city.

Traffic is also responsible for the increasing percentage of urban area

which is paved and, therefore, non-absorbent. This, together with housing density, with more area roofed, leads to reduction in foliage and rainfall run-off problems.

Care for the Environment

The theoretical base for a policy for the care of the environment must consist of an awareness of the ecological systems in which mankind participates. Furthermore, such a policy must endeavour to bring the activities of mankind into harmony with other biological processes.

An essential pre-requisite for an environment policy is legislation. This would regulate the behaviour of individuals and groups. This legislation should be backed up by specialized administrative machinery. This machinery should be responsible for seeing that the laws are put into effect; and the laws are continously revised and adapted to cope with new problems.

Some Guidelines for Deciding on a Transport Policy

i. Activities should be located as much as possible to minimize physical movement, and direct physical movement should be limited to the most suitable mode of transport.

ii. Serious thought and efforts should be made towards developing other forms of transport, specially those driven by electricity. There is great potential in Sri Lanka for hydro-power and this resource should be harnessed to a great extent to acheive fuel economy in transport and industry.

iii. Wherever possible and feasible canals and railways to be used in preferernce to roads, especially for goods traffic.

vi. In urban areas where possible private vehicles should be reduced to a minimum and public transport should be encouraged.

v. In rural areas, a system of minibus should be encouraged where people as well as goods can be transported at the same time.

vi. The allocation of funds for highway development should be more for rural roads. Preference should be given to improving the foundation and the surfaces of the existing roads rather than to widening of roads.

vii. Specific attention should be paid to decrease emission of hydrocarbons, carbon monoxide and nitrogen oxides from motor traffic. There could be a slight drop in feul economy as an increasing amount of crude oil is required to supply the same quantity of unleaded gasoline, but saving from possible environment damage should be worth considering.

viii. Studies should be undertaken more closely on the effects of building up of new highways and roads, on the drainage, on microclimates and on the general ecology of the adjacent countryside.

ix. Extension of access roads to wilderness areas should be restricted.

x. Since highways are extensive users of land surface it is worth considering the upgrading of already existing roads to form a major system of national road network to serve the maximum number of settlements in the island. Other utility lines such as water, sewerage, telephone, etc., could follow the same national road net work.