

TRANSPORTATION

An Overview

The immediate purpose of transport is to move physically, people and goods. Goods include food, industrial raw material, intermediate products and industrial finished goods. But why do we want to move people and goods?

The deeper purpose of transport is to enable specialisation of factorial functions. Goods are found, grown, processed or manufactured in one place and consumed in another. For this end the goods must move and, as one of the factors of production, men must move from where they live to where they take part in the processes of production.

A simple society, being largely self-sufficient needs little transport service. A complex society needs much transport and adds in the end its own desire to travel either for sheer pleasure or for the pleasure of something at the other end of the ride.

It is evident therefore that transport and travel can be minimised both by restraint in the use of goods that must be moved, and by the planning of land-use upon a sort of "methods pattern" so that people and goods need the least moving within the web of social development.

Alternatives to Transport. A further look at the objects of transportation show that transport services are never overall monopolies. There are two main competitors to transport: they are social self-dependence and electronic communication.

The first concept arises from the basic objects. Obviously if factories and homes are side by side, personal transport is minimised. If people live on the fields they till, and they grow most of their needs of food, clothing and shelter, they need neither to move themselves or much of goods.

Likewise culturally self-satisfied people do not need to travel to see theatre or pagentry or even go on pilgrimages. Thus self-feeding, handlooms, stay-at-home attitudes, preference for neighbourhood society, books and home games all compete with transport.

Secondly, electronic communication competes with transport. Is the conveyance of speech (by radio and telephone) the conveyance of pictures (by television, videophone etc.) the conveyance of data (through computer terminals) to be regarded as "transport" of ideas? If it is, then still it competes with transport in

the physical sense because a radio listener may not need a newspaper which would otherwise have to be transported (not to speak of the raw materials that went into its production). Likewise a TV saturated viewer need not travel to a cinema.

Nature of Transport

Transport generally implies movement. The movement itself is the transport. But movement requires tools and energy. Energy can be got from man or animal or from wind or river flow or by artificial means.

Tools are twofold. A container and a track. Of course the transport of some things (a jackfruit or a plank of timber for example) can be done without a container. And a man can walk across meadows, rocks, or swamps and can even swim across water. Yet a planned or defined track is a prerequisite for most forms of transport.

Means of Transport

The means are precisely the tools (track and container) and energy. Track consists of navigable water (ocean, lake, river, canal) roads, railways, cableways and flyable airspace, for all of which special terminals or interfaces are usually needed.

Containers include boxes and pallets and also vehicles of every description from bicycle to train to ocean-going ships. Vehicles subdivide into haulers (locomotives, tractors, mechanical horses) and trailers, yet the distinction between these merge more often than not.

Energy is sometimes there for us to use like gravity (used for wire shoots as well as down-river riding) and wind. Animals and man can tow or push burdens. Other energy comes from the conversion of heat into commercial fuels such as coal, oil, natural gas and from electricity, which itself may be generated from one or other of the primary fossil fuels.

Chief Transport Modes

The chief distinguishable modes of transport are water, road, rail and air. Of these water is the easiest, and it has the characteristics of slow speed, and low energy requirement. In fact the easiest transportation task is that of towing a barge through water. Water transport is cheapest where the track was provided by geological history, such as ocean, river and lake. Where man has made canals, the first cost is often high, but once built it remains almost for ever at low cost except where it is polluted or neglected and may need renovation.

Railways are the second-most conservers of energy. They were devised (some say first by the Romans, others quote Britain and Germany in the late 1700's and early 1800's), to make the horse's task easier. The horse could multiply his work on a well laid plateway. This economy continues to be of use though propulsion methods have developed to coal-steam; oil-steam; diesel; electric and gas turbines. Like canals, railways have considerable first cost but require far more maintenance and regulation. Their second characteristic is that they are cheap on labour (one train crew can move 10,000 tons or 2,000 people) and on space. The throughput of goods or people over an intensively used railway is very high.

Roads, are ancient but highways with durable foundations, smooth surfaces and good run-off drainage

are much more recent. Their characteristic is comparatively cheap first-cost, with the capability of gradual up-grading as money allows, and with multifaceted availability. A road can be used, subject only to special legal or physical impediments, by pedestrians, cycles, carts, lorries, cars, buses and even elephants. But roads have a limitation. In dense car-populated countries, the attempts to make them wide and fluent have run against the finite limit of how much of a city's space can be devoted to movement and how much should remain for work and leisure. Highways, however, have the great asset of extreme accessibility.

Airspace is much like rivers in that it is there, but it is increasingly becoming like highways in that its regulatable navigability is limited. It is good for transport of goods and people only so long as a limited number use it. Its other characteristics are high energy cost (gravity has to be defeated to start any journey) and far-distanced stopping places.

Newer track forms are emerging, notably pipelines and cryogenic electric transmission cables. Both take over the need to transport fossil fuel by road or rail. Things like hover tracks, magnetic levitation and slung cabinways are also under exotic development, but even if they do become viable they are characterised as "guide-ways" and are therefore akin to railways or cableways.

Problem of Space

The constraints of space have been mentioned in connection with roads and air. It also arises sometimes at terminals, stations, harbours and airports. The movement and the terminal act of interchange that goes with it are all part of transport and all require space.

Societies that have become dependent on automobiles and air planes have almost reached the limits of available space. But even in under-developed countries space on land is a scarce resource, especially developed track space (roads, canals, railways) and especially space in cities.

The problem is already acute in developed countries. Many professional transporters, economists, town planners and others are expressing increasing concern for rationing urban space and giving priority to those who use it sparingly and cleanly. Cities are restricting the use of motor cars. Singapore has done this with heavy price tags for using central streets in the rush period. And even the head of New York local transportation has taken his plea to an international conference this year for prohibition (of automobiles) "that would free ample space for bus services" wherever there is public transport available and for barring such vehicles even from inter-city use where public transport exists.

Hence the modern town planner and tariffic manager, whether in developed or under-developed countries, is no longer seeking to widen roads and improve traffic flows, he is now seeking to hamper traffic flow but to give priority to public transport which uses road space so much more economically.

Problem of Energy

Urban space and laid tracks are a scarce resource almost anywhere. Energy is equally scarce in all except OPEC countries, and on a world footing, oil is thought to be running out within the next 30-60 years. In Sri Lanka, certainly, energy is a scarce resource, but so is it in U.S.A., so much so, that some leaders have almost undisputedly welcomed OPEC price increases as bringing in a sense of reality. For example the same U.S. transit leader, (who is also Chairman of Rockefeller's Committee on Critical Choices for America), said at an international conference in May 1975:

"The events of the past year and one half have placed the future situation in a realistic perspective".

Energy works this way. What you require to move a ton of goods by road, will move four times that tonnage by rail or by water.

Where passengers are concerned the ratio in Sri Lanka is approximately that a private car rider requires 10 times as much energy as a bus or train rider.

Energy has another dimension. When supplied by thermal generation of electricity it may conserve fossil-fuel marginally, as against the direct use of oil. But where supplied by hydro, or nuclear generated electricity, there is no drawing on oil or coal at all, and very little noise or air pollution to boot. But how can electricity be used for transport? Only by using railways, tramways and trolley buses for passenger transport and railways, canals and cableways for goods. Transport of goods by lorries on roads, and transport of people by cars on roads do not figure in this dimension and are not likely to figure significantly because all the enthusiasm about new types of batteries and fuel cells has died out at least for the time being.

Thus energy conservation needs correct choices both in the mode of transport and in the form of energy.

Problem of Vested Interests

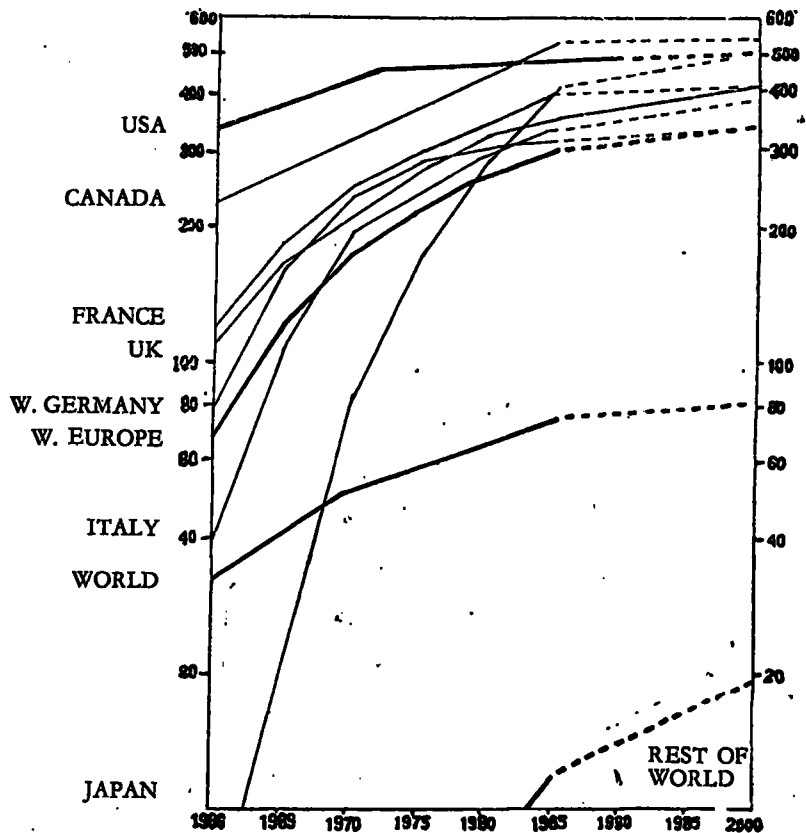
It is now generally recognised, and is increasingly discussed, though rarely put down in black and white, that a powerful conglomerate of vested interests has, whether deliberately or otherwise, distorted the development of transport in several parts of the world, particularly the U.S.A. and Western Europe.

The chief big interests with a common interest in this matter are usually labelled as the Oil, Automobile and Tyre interests. These interests are supported by various ancillary interests in spare parts components, and finish (e.g. paint) manufacturers, and in the vast distributive trades handling motor supplies at wholesale and retail levels. To these interests are further added the highway construction supply and contract industries and the trucking, taxi and rent-a-car businesses. These collectively are known as the "highway lobby".

But the highway lobby does not end with profit organisations. It includes professionals and consumers.

Professionals who support the lobby are the highway designers, planners and engineers, the traffic managers and regulators, and even the town planners. All of these, tend to be dedicated professional men pursuing their talents and skills in

Fig. 1 **Car Ownership** per thousand of population



"Growth in car ownership tapers off around 500 cars per thousand population. Japan was a late starter with a very rapid rise. Countries outside OECD hardly count."

attempting to solve the traffic or congestion problem in the interest, as they see it, of society. They see the symptoms of a problem and feel challenged to use their expertise to solve it, and even bring in the transport economists who will justify economic expenditure to build 6 or 8 lane motorways on the grounds that the prospective users will save their valuable time. Some new professionals are indeed emerging even in the World Bank and OECD, but the inertia against changing the trend is very strong indeed.

That British architects held a seminar at Durham University devoted to the new trend for restraint, and that OECD itself had a conference of case studies (including Singapore) on restraining the car, pedestrianising city centres, and even planning deliberate congestion to discourage cars, caused scarcely a ripple in world news or in Sri Lanka circles.

And then there are the consumers. In USA 500 cars per 1,000 in the population. In Europe 200-400.

In Singapore 80. In Sri Lanka 8. Even 8 can cause a traffic jam and hold up public buses. Even 8 consume a good proportion of the public highway for free parking; but whether 8 or 80 or 800; consumers of motorism like the article. It is an extension of home, a large handbag, a highly convenient means of personal mobility, even a liberator from restraints. As long as this consumer thinks that road development will allow him to enjoy this freedom the longer will he support expensive road programs and defer the real answer.

Wherever he be, the decision-maker is one of these consumers. If the number of consumers be small (as in Sri Lanka) the elite deciders and the automobile consumers are one and the same group. What will they decide given any plausible alternative?

Thus the road lobby is powerful even in Sri Lanka which has no auto industry, only ancillary interests, but has indeed professionals and consumers with powerful leverage. Is it possible

in this context for correct decisions to be made in favour of the present and the future, for meeting shortages of both space and energy resources?

The Railway in Sri Lanka

Generally speaking the Sri Lanka Railway has no corporate or self-image and therefore no corporate ambition. Some believe this to be the result of its status as a government department. Others hold it due to leadership factors during most of its 100 years of existence.

The full line extent of nearly 1000 miles, was built between 1858 and 1928. Since then except for links to the Cement factory and Clay grounds at Puttalam, there have been only retractions (Ragala, Yatiyantota, Opanayake and Puttalam) and one re-surrection (Puttalam). Electrification, proposed by Wimalasurendera in 1918, is still to receive sanction. Not even track doubling has been undertaken since 1930, only a singling (Rambukkana-Polgahawela). Thus there has been virtually no expansion for nearly 50 years and the length of track is low, by world comparisons in relation to population and land

area, although the terrain generally favours rail construction.

On the other hand there has been, at least up to 1970, considerable development by way of intensification of exploitation of the track and rolling stock. Two chief aids to intensifications have been the CTC signalling system and dieselisation of motive power, though some say that neither has been fully exploited.

The table below of comparative performance shows that Sri Lanka does extremely well in the ratio of loaded wagon to empty wagon movements and the ratio of average wagon load to wagon capacity. Both are important indices of productivity. In nearly all the other measures, Sri Lanka shows poorly even against Portugal and Greece whose railways are among the least sophisticated and developed in Europe.

Of particular disappointment is the declining share the railway has got of the country's goods needing transportation as seen in the table above. Perhaps with state take-over of plantations, the share of tea and rubber may pick up at least to the

full potential of estates within 10 miles of railway stations.

Table 2. Railway's Share of Nation's Tonnage ('000 tons) of selected goods

Goods	1955		1969		1974	
	Nation	Rail	Nation	Rail	Nation	Rail
Tea	167	92	225	33	201	32
Rubber	92	17	150	1	134	1
Plumbago	9	2	12	1	10	—
Oil	748	181	1753	301	1523	360
Cement	78	48	391	148	466	94
Sugar	187	20	311	9	105	13
Salt	40	32	117	15	113	8
Fertilizer	187	101	291	113	—	88
Flour	—	—	458	227	448	221
Rice	—	—	1245	316	1226	277
Coconut	—	—	—	21	—	10
	1616		1569		1104	

Even on diesel-oil, freight trains are held to be 3 to 4 times more efficient in use of energy than road vehicles. With electrification the energy gains are much greater because most of Sri Lanka's electric power comes and will come from hydro source. Even with thermal electricity, fossil fuel is more efficiently converted to electricity at a Central thermal station such as Kelanitissa than on board a diesel electric locomotive. If Kurunegala-Negombo-Kalutara were electrified there could be a saving, granted

Table 1. TRAIN STATISTICS OF SRI LANKA AND SOME SELECTED COUNTRIES

SRI LANKA (in miles)				(in millions)										
Year	Mid year population	Land area	STOCK			Train miles			PASSENGERS		GOODS			
			Passenger	Goods	Loco	Passenger	Goods	Total	Million passenger	passenger miles	Million tons	Million tons	Gross mls ton	
1963	...	10.6	25	1,022	4,181	355	5.2	2.0	7.3	69	1,342	1.79	200	
1964	...	10.9	"	1,015	4,048	355	5.1	2.1	7.3	73	1,453	1.87	218	
1965	...	11.2	"	1,055	4,095	355	5.6	2.0	7.7	74	1,498	1.56	196	
1966	...	11.4	"	1,040	4,208	357	5.8	2.1	8.0	75	1,537	1.79	212	
1967	...	11.7	"	1,013	4,129	355	5.8	2.2	8.0	78	1,585	1.09	212	
1968	...	12.0	"	1,004	4,095	344	5.8	2.3	8.1	82	1,678	1.82	221	
1969	...	12.3	"	996	4,171	393	5.6	2.3	8.1	88	1,781	1.79	220	
1970	...	12.5	"	991	4,150	340	5.8	2.6	6.5	86	1,825	1.70	228	
1971	...	12.8	"	984	4,117	332	4.7	2.0	6.9	83	1,734	1.76	207	
1972	...	13.0	"	992	4,117	332	5.3	2.3	7.8	85	1,907	1.77	211	
1973	...	13.2	"	700	4,081	279	5.4	2.3	8.0	89	2,051	1.89	204	
1974	...	13.4	"	710	4,081	289	4.5	2.2	6.9	69	1,726	2.0	197	
SELECTED COUNTRIES (Kilometres) 1973														
Sri Lanka	...	13.2	25	700	4,081	279	8.6	3.7	12.8	89	2,762	2.0	315	
Spain	...	34.4	194	3,237	44,060	1,802	84.0	46.9	132.5	193	15,640	37.6	11,561	48,939
Portugal	...	9.8	35	1,002	7,812	575	23.8	5.6	30.8	117	3,225	5.1	859	7,289
Norway...	...	3.9	125	1,002	9,411	409	21.7	9.4	31.4	30	1,640	31.7	2,843	
Sweden	...	8.1	172	2,328	51,188	1,206	55.8	43.4	99.9	68	4,500	65.2	7,036	46,529
Rumania	...	20.7	92	—	—	—	66.1	82.2	148.7	297	17,264	205.9	51,243	128,914
Hungary	...	10.4	36	—	—	—	63.5	43.3	107.6	323	12,611	121.9	21,315	63,067
Taiwan	...	15.1	14	1,212	7,767	413	26.7	9.1	36.9	141	7,940	17.0	2,780	14,496
Greece	...	8.9	51	538	9,495	424	—	—	—	19	1,615	3.3	798	4,286

Source: Sri Lanka figures G.M.R's Reports. Other figures UIC International Railway Statistics Year 1973.

hydro power, of perhaps $3\frac{1}{2}$ of the 11 million gallons oil used by the railway yearly. This would be approximately 100,000 barrels, which at \$11 amounts to Rs. 12 million per annum, or about 3% of the cost of such electrification.

For passenger service, electrification has further advantages especially with regard to acceleration out of station stops. This means not only a faster journey for the passenger but also better mileage output from the rolling stock and crews by reason of quicker turn-round.

With regard to both goods and passenger traffic, electrification has the further advantage that electric equipment (locomotive and rail-cars, or powered multiple unit train sets) usually has twice the life span of equivalent diesel stock.

Apart from electrification and capturing plantation produce there is scope for considerable development of the railway as is indicated below.

(a) **Extensions:**

Matara-Devundara
Puttalam-Anuradhapura
Matala-Nalanda
Kahawatta-Embilipitiya
Batticaloa-Akkaraipattu
Jaffna-Point Pedro

(b) **Restoration:**

Yatiantota
Ragala
Opanayaka

(c) **Multiple tracing:**

3 tracks Fort-Ragama
2 tracks Panadura Bridge
2 tracks Polgahawela-Kurunegala
2 tracks Jacla-Negombo

(d) **Containerisation**

(e) **Special tea handling depots:**

Bloemendhal
Trincomalee

(f) **Special rubber handling depots:**

Mutwal
Galle

On a more visible, but less economically important scale, there is scope for opening more passenger stations (e.g. Bambalapitiya Flats, and Urugodawatte), for exploiting the Mutwal and Kolonnawa lines for passengers, and for re-arranging significant railway stations to become joint passenger travel stations with the C.T.B.

Canals in Sri Lanka

The canals systems stretching from Puttalam to the Kaluganga and isolated sections elsewhere have largely fallen into disuse by neglect, partly because those in charge failed to see

their value. Some say vested interests hastened their demise, because right up to ten years ago pada boats continued, until silt in the canal and crumbling of the tow path prevented it, to carry copra from Chilaw to Colombo.

The new revival is certainly welcome because canals have such enormous advantages in energy conservation, labour intensity and environmental compatibility and even as an aid to urban storm-water drainage. But those who are promoting the canals will have to remain vigilant because, if the boats are made by village craftsmen and the SEC, and if most haulage is by man-power, there will be no vested interest to defend water transport, and the re-de-silted canals can fall into disuse again.

The comparative advantage of canals for bulk or heavy goods (including iron and steel, cement, salt, copra, fibre) as much as their disadvantage for perishable and high value goods which must move fast, must be accepted by transport competitors such as the Railway, the C.T.B., the Highways Department, even with realisation that the off-loading of some goods from road to canal will postpone the need for some highway improvements.

When Puttalam-Colombo is reopened there is no reason why the Cement and Salt Corporations cannot send their goods to Colombo by water, and meanwhile state coconut oil mills can buy copra on the canal bank.

Thereafter there is no reason why the proposed Kaduwela-Oruwala canal should not be dug for steel transport, canals restored southwards to the Bentara ganga, Ginganga transport of sugar and bricks revitalised and other schemes undertaken.

Trucks, Lorries and Vans in Sri Lanka

There is very little published data about the work done by goods road vehicles in Sri Lanka. Table 3 shows a steady increase from 27,000 vehicles registered in 1965 to 34,000 in 1971. Thereafter registration has been stagnant, which implies that retirements have been more or less evenly replaced by new imports. There is no certainty however, as to how many registered vehicles were actually in use.

A different indicator of the significance of lorry and van transport is given in Table 2 which shows that the railway has lost a lot of its potential haulage business. Typically the railway carried 92,000 tons of tea and 17,000 tons rubber in 1955, but only 33,000 tons tea and 1,000 tons rubber by 1969. The 1974 position is a little lower, notwithstanding that the state took control of a significant plantation acreage and could have directed part of the captured produce to the railway.

The implication is that lorries have captured the business which the railway has lost. The Report of the Transport Commission, Sessional Paper XXIII of 1967 finds that rail tonnage remained static while lorries took up the entire tonnage increment reflecting a 21% increase in GDP from 1959 to 1964.

The same Commission estimated certain data about the lorry fleet.

Registration 1965

Colombo	12,000
Elsewhere	14,000
Total	26,000

Payload 1966

2½ tons and over	13,000
Lower (mostly 1½ tons or under)	15,000
Total	28,000

Fleet Ownerships

Government departments ...	2,700
Others with 10 or more ...	2,600
Total	5,300

While complaining about lack of data in respect of the whole road haulage activity, the Commission made the following assessments:—

Million tons for Transport 1965

Agriculture and imports ...	3.60
Export	1.00 4.60

Increment to 1971

25% of 1965	1.15
Industrial raw materials ...	1.2
Generated increases ...	2.0 4.35
Million tons for transport in 1971	8.95

Road Haulage

<i>Sbars</i>	<i>M.Tons</i>	<i>Lorries</i>
1965	4.6	13,000
Increment	2.0	6,500
1971	6.6	19,500

However, the Commission made no study at all of ton-miles, which is essential to an understanding of the quantity of haulage and of the fleet requirements. The figures indicate that in 1965 lorries of payload 2½ tons and over carried 350 tons each per annum and the new 6,500 lorries recommended for import would each carry 300 tons per annum. Assuming an average haul of 100 miles and average capacity of 3 tons, the 1965 fleet worked an average of only 40 miles per lorry per working day and the new lorries were to be worth only 33 miles per day.

Table 4 shows operated buses, which can only work during the "traffic day", (i.e. at times of the day when there are passengers) run about 150 miles per day. Even allowing one in three buses at depot for repair, this is 100 miles per total bus per day. For a lorry to work only 30 odd miles per day, with less restriction on useful working hours, shows gross under-utilisation of scarce capital equipment.

This emphasises that whereas meticulous cost benefit studies are imposed before investment in railway infrastructure or rolling stock, or in electrification, investment in lorries is recommended and proceeds without serious analysis.

Incidentally the same Commission recommended the abandonment of canals and closing the KV railway beyond Homagama. The analytical approach to road transport, examining the resource cost of transport, the

possibilities of improving utilisation, and comparison with rail and water mode does not appear to have still emerged, and is badly needed.

Until such analysed data is available it is necessary to consider road transport on first principles. The nature of the vehicles and the track is such that the cost in terms of energy, vehicle-wear and track wear is necessarily higher than rail or water, but allowance must be given in appropriate cases for circuitry of the total trip via rail or water.

	1961	1973	1974
Buses operated ...	2,500	4,600	4,300
Million Miles			
By buses ...	120	250	235
By passengers ...	3,400	9,200	7,900

Growth upto 1973 must reflect, to some extent, growth in economic activity as well as growth in bus transport supply. In the case of bus transport it is common in developing countries that suppressed or latent demand is tapped by an increase in the service provided.

Table 3 VEHICLE REGISTRATIONS (thousands)

Year	Cars and Taxis	Motor cycles	Lorries and Vans	Omnibuses	Other vehicles	Total
1965 ...	82	18	27	8	13	149
1966 ...	83	18	28	8	15	152
1967 ...	84	18	29	9	17	157
1968 ...	85	18	29	9	20	161
1969 ...	87	19	31	10	22	169
1970 ...	88	20	33	10	26	177
1971 ...	88	21	34	11	26	180
1972 ...	89	22	34	12	27	184
1973 ...	90	22	34	12	30	188
1974 ...	91	23	34	13	31	192

It is also necessary to consider that it is no longer suitable for private enterprise, state corporation, or government department to choose its transport mode solely by reference to its own convenience or the profit or loss shown by its own book-keeping process.

Buses in Sri Lanka

Table 4 shows considerable growth from 1961 to 1973 followed by a drop in 1974:—

The drop in 1974 may be attributed to elasticity of demand following stiff fare increases in 1974, themselves consequent upon general inflation as well as the direct and indirect effects of the oil price increase from \$5 to \$10 per barrel.

Table 4 also shows a decline in the last few years in daily bus utilisation from a peak of 157 miles per operated bus per day in 1967-1969 to about 150 miles per bus per day. This may reflect partly a curtailment of the traffic day (i.e. less late night services) and of off-peak services, and partly a lowering of scheduling and operating efficiencies.

Whereas in many countries, including even USA and Western Europe, the energy crisis resulted in an increased emphasis on the need to improve the quality and (by subsidy) keep down the price of public transport, a different philosophy seems to have emerged in Sri Lanka.

For example a minimum fare of -/20 seems deliberately intended to inhibit short-rides, though at the time when short rides are not in any case inhibited by queues or crowding, empty capacity is available at practically no cost. Another example is

Table 4 C.T.B. STATISTICS

Year	Million Miles		Miles per operated bus p. day	Buses operated	Rides per head of population
	Bus	Passenger			
1961 ...	121	3,412	133	2,489	61
1962 ...	123	3,711	134	2,511	64
1963 ...	119	3,782	134	2,442	63
1964 ...	138	4,525	140	2,708	73
1965 ...	160	5,040	145	3,019	80
1966 ...	184	5,734	151	3,342	90
1967 ...	209	6,319	157	3,642	98
1968 ...	213	6,966	157	3,699	105
1969 ...	221	7,267	157	3,861	107
1970 ...	237	7,445	153	4,249	108
1971 ...	241	7,419	147	4,494	105
1972 ...	270	8,698	154	4,799	107
1973 ...	251	9,213	150	4,590	107
1974 ...	235	7,905	149	4,302	93

the announced strategy of reducing the number of bus-stops, partly to discourage travel and partly to "conserve" brake linings, clutch plates etc. As far as energy is concerned, Figure 4 shows graphically the following relationship:—

Table 5

FUEL CONSUMPTION			
	Mil. Pmg. miles	Mil. gals. oil	Pmg. miles per gal.
Bus ...	7,900	22½	350
Train ...	1,700	5½	310
Public ...	9,600	28	340
Car ...	700	28	25
Total	10,300	56	185

It would not be unreasonable to suppose that other costs in scarce resources are proportionate, so that if travel is to be discouraged in order to conserve foreign exchange or any other resources, the primary discouragement should be placed upon car travel and not on bus travel.

Moreover, if by apt improvement in the quality of bus services and by rationalising the bus fare structure, it is possible to lure half of the car travel into buses there would be a saving of no less than 13 million gallons of petrol worth say £20 million (not to speak of personal savings to the travellers) as well as parallel saving in wear and tear.

Quality of bus service includes very importantly the convenience, accessibility and walking distance to bus stops, the frequency of service, the availability of service at off-peak and late evening, as well as comfort, short overall journey time, and less psychological frustrations in travel. In this context it should never be forgotten that all bus travel starts on foot and ends on foot.

Automobiles in Sri Lanka

The position of automobiles has already been discussed as a comparison measure in earlier paragraphs. Table 3 shows that motor cars on the register have increased from 82,000 in 1965 to 91,000 in 1974.

Petrol consumption in Table 6 shows the use by automobiles has declined from 38 million gallons in 1973 to 28 million gallons in 1974. This gives a 27% drop in

consumption, (and therefore of car mileage) against a 100% price increase. This is a considerable elasticity.

Table 6

TRANSPORTATION OIL SALES (in Millions Gallons)		
	Petrol	Auto diesel
1964 ...	42.2	39.6
1965 ...	41.5	42.8
1966 ...	41.0	47.2
1967 ...	41.2	53.2
1968 ...	42.3	55.9
1969 ...	43.6	60.4
1970 ...	43.7	65.3
1971 ...	40.5	73.4
1972 ...	38.7	72.8
1973 ...	38.3	72.8
1974 ...	27.8	67.1

Source: Petroleum Corporation

Car registration has increased slightly more slowly than the population, so that the car density has declined from a maximum of 10 per thousand in the middle fifties to 7½ per thousand in 1974. This compares typically with:—

Table 7

CAR DENSITY (per 1000 population)			1970 actual	1975 estimate
U.S.A. ...	...	...	434	456
Canada ...	...	...	313	369
France ...	...	...	244	294
Britain ...	...	...	211	270
Japan ...	...	...	85	174
Singapore ...	...	...	*	64
Greece ...	...	...	26	46
Sri Lanka ...	...	...	7	8

*not available

From 1970 onwards, when cities were increasingly unable to manage traffic congestion (despite billions spent on fancy highway and parking schemes) air pollution and noise caused by private cars, and from 1972 when the energy crisis was already foreseen (as a quantity, if not as a price problem), organisations ranging from OECD, to Nelson Rockefeller's Commission on Critical Choice for Americans, to the International Union of Public Transport, to the Royal Institute of British Architects have been pleading for restraints on the use of motor cars especially in cities. They are even getting responses to their pleas and many cities are taking firm steps including—

- priority for buses at traffic signals.
- one way for cars but not for buses.

- down-town car licences (Singapore charges \$3 per diem).
- legal limits to private parking places in new buildings.
- pedestrian-only and pedestrian plus-tram-only streets in city-centres.
- no parking on bus and tram routes.
- thinning roads and bulging (the opposite of rounding) corners.
- deliberate, planned congestion.

In fact some responsible spokesmen in USA have gone so far as to welcome OPEC price increases as being a blessing because of their assistance to the advocates of car restraint.

Possibly because Sri Lanka is considered by the relevant authorities to be a well-to-do nation, none of these messages seem to have reached Colombo.

Highways in Sri Lanka

The discussion on lorries, buses and cars in the last three paragraphs has necessarily touched upon the highway which they all share as their track with such commercial energy conservers as cyclists, bullock carts and pedestrians, as well as with children and dogs and other dalliers and with miscellaneous goods for which the highway is often a free godown.

The Director of Highways Report for 1969/70 (issued—August 73) refers to 13,225 miles of road under its jurisdiction of which 11,745 miles were in motorable condition. The Wilbur Smith Report gives the following breakdown of PWD roads in 1962.

Width	Miles	%
8' - 15'	9179	89
16' - 23'	1030	10
24'	71	1
	10280	100

This excludes Municipal Roads of which Colombo had 155 miles including 54 miles in Class I.

Highways have tended to develop in Sri Lanka at best upon the subjective judgements of district highway engineers and at worst upon whims of political decision makers.

Where cost/benefit, or viability studies have been done prior to investment (or sometimes as post-facto justifications) they have often proceeded on two bases, one of which is invalid ab initio and the other unproved. The bases are:—

- (a) measurement of traffic volume by vehicles instead of content (people and goods).
- (b) giving value to the time saved by people expected to travel faster after the improvement.

With regard to volume of traffic the only comprehensive study in Sri Lanka was done in 1962 by Wilbur Smith Associates whose all-island traffic flow maps are based on vehicles. In a special section the Wilbur Smith Report gives the average bus load as 30 passengers compared with 2½ occupants per car. Thus in function a bus is worth 12 cars although in terms of passenger per dynamic road space occupation or congestivity, it may be worth 6 cars. Yet the flow maps equate one car to one bus and one lorry; and bicycles which constituted 42% of the all island "daily" count do not figure in the flows.

With regard to the value of time, several authorities now challenge the formulae (adopted for the British MI) which assume that a man will use beneficially the time that a better road will save him, and assume that the time-saving will not be cancelled out in the longer term by new traffic attracted by the improvement.

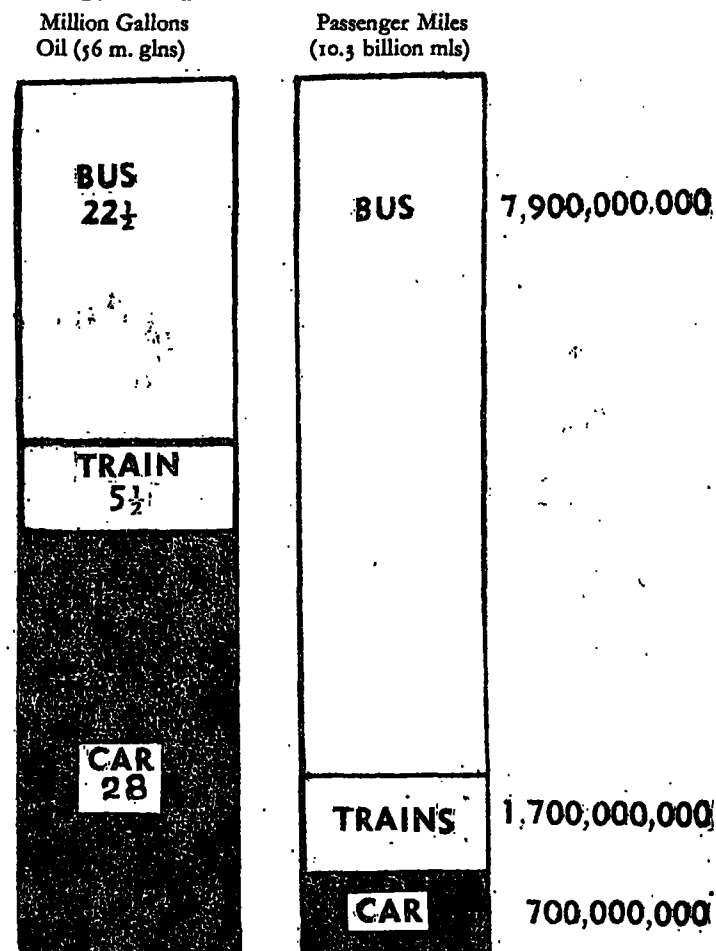
It would be interesting to know whether the Katunayake-Colombo, Galle-Face-Centre and Duplication Road projects, for which considerable resources have been allocated, could stand up to a cost/benefit study which counted persons and goods instead of vehicles and which omitted values for personal time savings and which took account of parallel under-exploited transportation tracks such as the railways and canal.

A conclusion is not unreasonable that the decisions to construct, widen or improve highway and bridges are

The importance of good transport to a country is so vital that it is now accepted practically as an axiomatic truth that "every country pays for the transport it has not got".

"Transport Conditions in Ceylon"
Donald Rutnam Report, 1944.

Fig. 2
Energy for personal transport in Sri Lanka 1974



made upon the subjective view of symptoms (bridge queues, traffic congestion) and not upon a study of the causes of these symptoms and possible remedies thereto.

Towards a Solution in Sri Lanka

The first step towards a solution of present transport problems, and visualising a policy for the future most surely depend upon:—

- (a) identification of the real problems (in terms of people and goods).
- (b) collection of reliable data.
- (c) a knowledge of the available technologies.

Such study requires a synthesis of the skills of town-planners, transport technologists, resource lexicographers, statisticians and economists, and thereafter joint planning in the light of the prevailing social and political philosophies.

From the time the Club of Rome published its work on "Finite Re-

sources" most serious economic studies have considered the conservation and efficient utilisation of scarce resources to be the paramount guide for development. This applies no less to transport than to any other field. It could therefore be suggested that the future of transport in Sri Lanka should be based upon a policy with at least some of the following guidelines, wherever there are no compelling reasons to depart from them:—

- (a) The location of activities to minimise physical transport.
- (b) The use where feasible of animal power, man-power and electric power in that order as propulsive energy.
- (c) The use where feasible (and where intensity of traffic volume justifies installation and maintenance) of canals and railways in preference to roads.
- (d) The use of public carriers in preference to private carriers on roads.

- (e) The allocation of highway development funds to rural roads, and to improving foundations for roads needed by heavy vehicles, in preference to widening roads and bridges needed to cope with private vehicles.

WORLD RAILWAY TRENDS

The directions of world railway development, as evidenced by decision-making in the last few years are mainly construction of new lines, in socialist countries, substantial electrification all over the world, containerisation and unit-trains for cargo in developed countries, sophisticated metro lines in metropolitan conurbations, and railway bankruptcy in U.S.A.

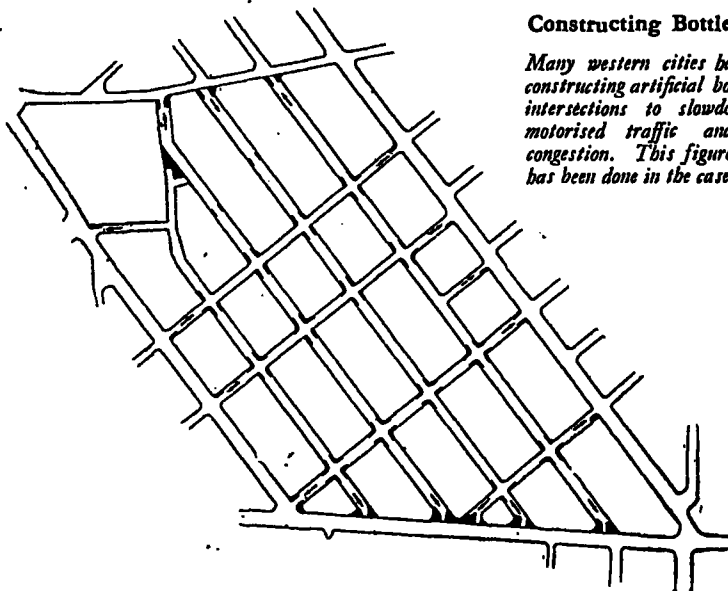
Starting with the last, U.S.A. the fortress of private enterprise, is in dilemma because most of its privately owned railroads in the N.E., and even one in the mid-west, have entered bankruptcy. Why? And passenger carrying except for commuter and subway trains would have been a thing of the past had Congress not set up "AMTRAK" to take over and operate, at a loss, a few inter-city trains. Why? And now Congress is considering CONRAIL to operate all or most freight trains in the North East. The answer is very complex. Railroads have shed passenger trains as quickly as allowed to over the last decade. Freight trains are governed by antiquated work rules which demand a five-man crew. Railroad track was perhaps over built in their heyday. Passengers have deserted to automobiles, bus lines and airlines. High value light freight has deserted to highway trucking. All this, plus excessive federal regulation (of prices, routes, interchange, merger etc.) together with the typical American emotional inability to consider nationalisation as a means to rationalising the use of railroad resources and facing the book-keeping losses, as other countries do, from national taxes, have led to the decline of the railroads which were once the constructive, developmental and binding factor of the U.S.A.

Unit-trains, where cargo is booked and moved in train-loads (of anything between two and twenty thousand tons) instead of wagon loads or less,

and containerisation where the goods are stuffed into or de-stuffed from large containers (typically 20' x 10' x 8' or 40' x 10' x 8') at points of origin and destination have been developed all over the industrialised world to speed up the movement and productivity of expensive railroad, port and shipping plant (which is a scarce resource all over the world) as well as of the goods themselves. Mechanisation of handling has also led to the need for less labour, which is a scarce resource in developed countries.

In large cities, mostly with population of 1 million or more, metro

Fig. 3



Constructing Bottlenecks

Many western cities have now taken to constructing artificial bottlenecks at road intersections to slowdown and reduce motorised traffic and defeat traffic congestion. This figure shows how this has been done in the case of a road grid.

railways (underground, elevated, and on median strips of express highways) are being built or expanded at great cost to defeat traffic congestion and so enable public transit passengers a faster journey than private car riders. But cities that have restrained the private car have been saved this expense.

Entirely new railways, some of considerable length, are being constructed in U.S.S.R., China, most socialist countries, Canada and Japan.

Electrification has entered a big new age of expansion. Table 9 (on page 14) shows the extent of electrified lines, train miles and gross ton miles in selected countries in 1973. The following is a short list of some of the significant developments or plans announced in 1974 and 1975 most at high-voltage AC (11,000v to 25,000v and even 50,000v) and commercial

frequency (50 or 60 Hz) but some at the more traditional DC 3,000v or 1,500v. All these will gather "juice" from overhead catenary, third rail being used only for metro urban rapid transit railways.

Denmark: Plans for mainline electrification submitted to Parliament in September 1975.

Greece: Five year plan 1976-1980 includes electrifying Athens to Domokos main-line.

Italy: Electric traction on Ciampino-Colleferro (part of Rome-Naples main line) inaugurated in 1975. Ciampino to Caserta 200 km. now

being electrified. Rimini-Ravenna-Ferrara on the east coast is next in the plan.

Taiwan: West Coast main line 494km. electrification now under construction by British contractor.

Portugal: The 1974-1979 plan will increase electrified track to 470 km.

Paraguay: Asuncion-Camen 400 km. to be electrified with Japanese aid.

West Germany: Further 276 km. of main line to be completed and handed to electric traction by end of 1975.

Pakistan: Khanewal-Samasata (73 miles) and Lahore - Rawalpindi (180 miles) electrification projects issued in January 1975.

Poland: Electrification of Zawiercie-Radzice 143 km. to be completed in 1976.

Soviet Far East: In addition to completing electrification of the entire Transit Railway, the new "BAM" cut-off line (Krasnoyarsk - Lena-Zeysk-Komsomolsk-on-Amur) of 3200 km. length is to be electrified after initial working with diesel.

Bulgaria: 957 km. of new track has been built since 1945. By 1972, electrification covered 1016 km. The 6th five year plan includes electrifying another 596 km. of route.

TRENDS IN WORLD TRANSPORT

The dominant role of rail and water in the transport of goods and passengers, which reached its world-wide zenith in the 1920's, has declined significantly and to some extent irreversibly since then.

The decline was the result primarily of the evolution of the small scale internal combustion engine, and of the design of aircraft. These two developments have stimulated great leaps forward in the design, construction and management of highways and of airports and of means of regulating them. The pipeline has also made a significant intrusion as a transporter of liquids.

These trends towards highway, air and pipe, and away from rail and water have been most marked in the OECD countries. Yet the same trends are beginning to emerge in Eastern Europe, as evidenced by the holding of an International Road Federation Conference in Budapest in September 1974, just as three braking factors are beginning to slow down the trend where it originated. Perhaps the two opposites are interconnected, because if OECD air and auto growth is slowing down, if not yet declining, the manufacturers may wish to lubricate a vast potential market for their products and technologies in Socialist Europe.

The three significant braking forces on auto and air growth in USA, Japan and Western Europe are ENERGY (both price and impending scarcity) POLLUTION (air and noise) and SPACE SHORTAGE (evidenced by incurable congestion).

Hence in the wake of the Club of Rome and various macro socio-economic studies of world growth limits and finite resources OECD is

sponsoring studies of how the motor car is consuming limited resources of fuels and metals, how internal combustion engines and taking air pollution and noise beyond human inconvenience into a health threat, and how cities, and the commerce and culture that lives in them are being stifled.

Environmental groups and ecologists are taking up these issues along with those of industrial pollution (atmospheric, thermal and noise) airport noise, uncontrolled effluence, man-made climatic change and deforestation to such an extent that many countries have state departments or institutions charged with environmental protection, and France even has a Cabinet minister for the "Quality of Life".

It is perhaps significant that Britain's Minister, and Department of the Environment has taken over the subject of transport from the Ministry of Transport, which no longer exists.

Highway trucking and airways have also come under attack because of their noise, pollutant emissions and energy intensiveness and highway construction has come under attack because of its disruption of settled social communities by splitting them, isolating them or opening their privacy to the world.

Motor vehicle manufacturers are conforming reluctantly to newly regulated standards in the matters of emissions, exhaust noise, and tyre tread noise, and the trend back to train, tram, and bus though advocated

by all the ad-hoc advisory committees and task forces appointed by Presidents and Ministers is not yet showing marked performance. Meanwhile most railways, most airlines, and most buslines the world over lose money, and this is complicating the problem. Thus in the industrialised capitalist countries transport of goods and persons is in a state of indecision (in the USA an impasse) and although the solution is known, movement in the desired direction is impeded by consumer life-styles, vested interests, and the share costs involved in construction of rail alternatives.

The picture is different in the Socialist countries, where the motor car and in its wake the super highway has not yet, except perhaps in Czechoslovakia, become an irresistible "growth" urge. Hence transport by water and rail is more planned, and more evident so far in such countries, where each mode of transport tends to play its appropriate part. It is possible however that the decision-making elite in these countries, treading the motor-car for its convenience to their own life styles, and not foreseeing that this benefit diminishes as car ownership spreads, will ordain highway development to ease the growing visible problems of congestion, and so set in train the whole series of developments that take away traffic from rails.

Such trends have not been sharply arrested by the "energy crisis" perhaps because the USSR is the largest oil producer in the world and does not yet see as a problem the exhaus-

Table 8 WORLD MOTOR VEHICLES 1973

Country	Population (million)	thousand cars	buses & trucks (thousand)	vehicles total (thousand)	Cars per 1000 Population	Persons per car
1. U.S.A.	211	101,762	23,658	125,420	476	2.1
2. Canada	22	7,823	1,797	9,620	357	2.8
3. Australia	13	4,506	1,077	5,583	345	2.9
4. Sweden	8	2,502	164	2,666	303	3.3
5. Britain	56	13,497	1,985	15,482	244	4.1
6. Japan	109	14,473	10,525	24,999	133	7.5
7. Portugal	8	728	214	942	91	11
8. Czechoslovakia	14	1,193	248	1,441	83	12
9. Chile	10	214	171	385	37	27
10. Zambia	5	66	43	199	14	51
11. U.S.S.R.	251	1,815	5,060	6,875	7	138
12. Sri Lanka	13	89	47	136	7	149
13. Rumania	20	125	—	—	6	166
14. Pakistan	67	177	79	256	3	377
15. India	574	778	511	1,289	1	738
16. Nigeria	80	97	59	156	1	822
17. China	800	30	649	679	—	26,756
World	3,679	233,966	62,561	296,527	67	15

Source: 1975, Automobile Facts and Figures, Detroit

tibility of fossil fuel. In any event, as late as September 1974, nine months after the big OPEC price increase, socialist engineers and planners got together in Budapest with their counterparts from OECD countries to discuss highway developments.

In developing countries (and China ranks with them in this matter) natural resources are not so recklessly squandered on transport. Most personal movement is by public transport, and most goods by resource-economic means such as bullock carts, man-pushed barges and railways. Yet the trend towards highways is clear. In fact the ruling attitudes, and therefore the allocation of capital funds for transport development, are influenced by the exclusive nature of the elite. All decision makers and all of those who influence them are non-users of public transport, and with almost absolute mutual exclusion those who use public transport are not decision makers and have no influence upon decisions or even upon the thinking processes of the elite.

Hence obvious misallocations of resources are not perceived as misallocations, and devious means of curing balance of payment problems, improving the quality of life etc. are not seen. Despite this railways are being built in developing countries, especially where heavy minerals have to be carried, but the messages emerging from professionals in UN, UIC, UITP, OECD and other international bodies are either unheard in developing countries or misinterpreted, perhaps wilfully, as that of industrialised countries not wanting the poor to develop a taste for exhaustible world resources.

CHARGING FOR PASSENGER TRANSPORT

A year or so back Rome ran its tram and bus services free for two weeks. The purpose of the experiment was to induce city travellers to leave their cars and scooters in their suburban homes and travel by public transport. The city thought that it would cost less in social terms to run the transport service free than to cope with traffic congestion, automotive air pollution and noise caused by private vehicles. The experiment

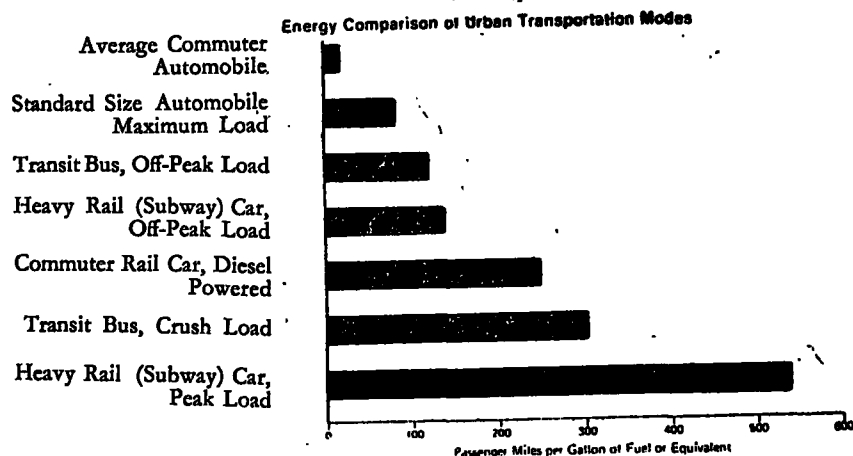
failed to attract sufficient riders to be effective, and proved that cost is not a predominant determinant for people who can choose between private or public transport.

In Nottingham, buses plying between fringe car parks and city centre are free. This scheme is a success because cars are restrained from going where the buses go. Then why not charge for the bus trip? Nottingham's answer is that first they wanted a deal to be traded to motorists in exchange for the restraints and second that the cost of running the special buses is negligible compared to the social cost of motor cars clogging, stifling and de-economising the central business district which pays the highest rates.

Both Rome and Nottingham and others have tried free buses as an ingredient in schemes to relieve congestion. Others have considered free trips as a means of overcoming scarce resources. In countries where man-power is scarce, bus and tram conductors are hard to get. They can cost up to 40% of the total journey cost and, if fares do not cover cost, over 40% of the price they are put there to recover. One-man operation is common but does not completely answer the cost problem because his work of collecting fares and issuing tickets, (irrespective of the sophistication of the gadgets used) slows-down the vehicle and thus increases all costs per distance travelled.

Hence it is argued: save man-power costs by collecting fares through the general rates and taxes system.

Fig. 4



Source: '74 - '75 Transit Fact Book Washington D.C.

Flat fares are often used on systems (especially in U.S.A.) to ease the fare collection problem. But the short distance rider pays more than his due share, thus subsidising the long ride passenger, especially if the fare is intended to be profitable. But there is a bigger problem. The flat fare inhibits the operator from extending the route as development proceeds beyond the terminal.

Could free travel be contemplated for long distance rail journeys? Would they stimulate wasteful demand? Would they encourage, for example, long distance commuting? If demand was drawn away from more resource-intensive modes of travel the nation would gain and would have a problem only of re-adjusting internal incomes, but if demand was unduly stimulated from non-travel the position would be different, but ought to be measured before being dismissed out of hand.

If completely free travel is rejected as impossible or undesirable, would token payment be apt, like the twenty five cents paid for hospital service?

The difference would be made up by subsidy from local or central government, in other words paid by the tax-payer at large instead of by the specific rider.

This subsidy is accepted all over the world. In Sri Lanka it has been accepted de facto, but not willingly. Elsewhere the concept is willingly adopted.

For example British Rail in 1973 lost £5 million after receiving a

Table 9 SOME INTERNATIONAL RAILROAD FIGURES 1973

Country Name	Size		Route km.		Train km.		Gross ton km.	
	Mln. Pop.	'000 sq. m.	Total	elec.	(million)		(million)	
					Total	elec.	Total	elec.
USA ...	178	3,615	333,245	400	865.0	—	2,739,764	—
Canada ...	18	3,852	66,367	31	137.4	—	335,939	—
India ...	403	1,260	60,149	4,055	473.4	80.5	358,480	17,347
Japan ...	93	143	21,099	6,961	701.3	475.1	303,250	245,198
France ...	45	213	36,300	9,317	477.8	299.1	267,966	206,007
Britain ...	53	94	18,277	3,461	452.1	150.8	—	—
Czechoslovakia	14	49	13,293	2,639	248.6	89.9	153,787	87,815
Spain ...	30	194	13,298	3,413	132.6	61.1	48,939	24,031
Portugal ...	9	35	3,588	417	30.8	10.2	7,297	3,420
Zaire ...	14	905	2,961	858	10.8	4.4	6,476	2,753
Sri Lanka ...	10	25	1,595	—	12.3	—	—	—

subsidy totalling £91 million from the Central Government and various regional governments.

AMTRAK, the quasi-federal sole operator of passenger trains in US, which has no other function, lost \$529 million in 1974 after receiving a grant of \$190 million. The federal government paid, and will continue to pay both operating losses and capital grants.

Chicago Transit Authority (operating buses and subway trains) lost \$62 million in 1974. The loss is shared by City, County and State governments as an act of policy not as a reluctant bailing out operation.

Of course in these countries the problems arise from congestion created by enormous car populations. Unless public transport takes some of the people off the highways the latter will choke to death. Hence highway users as much as transit-riders are willing to pay to keep transit going. Part of the public transport problem is slow bus services due to motor car congestion, and poor income due to poor patronage.

In developing countries the car populations are low, but it may pay even those who own and use the cars to keep it that way. Hence payment by all for good public passenger transport services is not really a subsidy, but payment for a benefit received.

SOCIAL NATURE OF TRANSPORT

It is accepted throughout the world that some services are social

or infrastructural by nature. Hence street lighting, police patrols, public parks, footpaths, are provided at great cost, but no charge is made when a consumer uses or benefits by them.

In most, or at least many countries the entire highway system, the education system, the health system is also provided as a free service.

In all these cases the consumer is not asked to pay each time he uses and benefits by the service. The services are provided at great cost, and technically at least, the institutions that operate them, operate at a loss.

In some cases, where the possibility of charging is apparent, or where in other countries these services are charged for, the cost is regarded as a *social subsidy* but in other cases the word subsidy is not used.

Should not transport be similarly regarded? One aspect of it, the highway system is so provided, except in a few places where usage-tolls are charged on particular stretches, as a social infrastructure. So why not the track used by barges and trains? And if the track why not the vehicles which are as much part of the means of moving people and goods as is the track on which the vehicles move.

There are two chief advantages in regarding all transport as a social overhead or infrastructure. Firstly the objectives of transport will be clearly seen in physical terms and not observed by profit and loss accounts. Secondly the resources used would

tend to be measured against the output of service.

For example a telephone system, once installed at whatever investment cost, can handle simple messages at negligible cost in resources, much less than that of manufacturing, writing and carrying a post card. At a more sophisticated level a half-hour telephone conversation costs much less in the consumption of scarce resources than does the travel by one party by car to the other party's residence to engage in the identical conversation. Yet in both these cases the cost to the consumer, or at least the apparent cost, the immediate, out-of-pocket, cost, is much less for the message made that costs most in resources, and in each case the price of the phone call inhibits its use.

This example is in the comparison of one mode of communication with another. But an examination of transport in comparison with other economic activities is also apt.

Employees can be brought to work by employer-owned lorries, by free issue bicycles, by public transport, or by foot if housing is close by. The employees social function is bus, not riding. He must be transported to work else he will not contribute to economic output. Hence the service of transporting him is more useful to the employer and the society than it is intrinsically to the employee himself. This is easily seen in the case of to-work trips.

But what about from-work trips? If a convenient and healthy return trip is also socially desirable because the worker must feel induced to travel to work on the morrow, the *from-work* trip is also a social service. Then what about the workers ride to the cinema, or the zoo, or a pilgrimage for his family, or his children's rides to and from school?

In most, if not all of this riding, the ride itself is not the object of consumption, but an inconvenient impediment between the rider and what society wants him to produce, or what he wants to consume.

With goods too, transport of produce from surplus or manufacturing areas to deficit or consuming areas does not add intrinsic value to the

produce. The product does not want or need the movement itself, but only the market which has been separated from it by some human historical process. If a country is to remain cohesive, goods and people must be moved over the distances that separate them. This movement is a social service arising from the spread of a nation, and the investment in the means of movement is social infrastructure.

Yet, it can be argued, what about textiles. Is not the production of apparel a social service, and the investment in textile factories a social infrastructure. The question is also one of proportion. Minimum or modest clothing may add to national cohesiveness, but most clothing is not so socially caused, whereas most transport is.

Everybody accepts street lights, law courts, parks, and the Kandy Lake as social needs or amenities. Everybody accepts cinemas, playing cards, novels, electricity as personal consumer items. But where does transport fit between these extremes. If it is placed as a social need the questions will arise of how to charge consumers for the capital cost of the infrastructure, and the avoidable cost of each trip or haul.

Most of the world provides highways free, (but not so canals, railways and airports), but separately charges taxes on things like petrol, whisky, cigarettes, part of the proceeds of which are used for capital and maintenance charges on the highway system.

Many countries charge for parking private vehicles on public highways or adjacent land. Sri Lanka urban governments charge buses for such parking, but only Singapore charges differentially for the right to use highway space where and when it is most scarce.

In Chicago the capital cost of a new electric railway service was contributed by the Federal State, City, Country and Village governments presumably because all these authorities thought that treasures garnered from general rates and

taxes should contribute to a social need.

The question of whether transport is a social service or an independent economic activity, goes to the root of the allocation of resources for it, the return social or financial that may accrue from the allocation, and the criteria for measuring the social return.

THE SIGNIFICANCE OF TRANSPORT

Our overview has concerned itself with the purposes, alternatives, nature, means and chief modes of transport and then taken a closer look at the problems of space, energy and vested interests as they affect transport. Thereafter, the main forms of local transport such as railways, canals, trucks, lorries and vans, buses, cars and highways and the main issues connected with them were further analysed. The major trends in the field of transport, in the international sphere, and repercussions of most recent developments in this field were next dealt with and this led on to the key issue of why and how passengers should pay for public transport and finally the very essence of this question which is the social nature of transport.

The factors pervading all these issues is that transport and communication are vital to general economic growth. They provide the infrastructure without which neither industrial nor agricultural development is possible. Transport development contributes to economic progress by enlarging the market and thereby further stimulating economic specialization; helping the exploitation of additional resources by making them accessible; and facilitating the establishment or expansion of other industries. In association with other favourable factors, transport development would enable the economy to become more dynamic and move forward on its own momentum towards higher efficiency and higher output.

The transport 'system' comprises mainly roads, road transport, railways, ports and harbours, shipping, airports and aviation, and posts and

telecommunications. In the case of Sri Lanka, we have a comparatively well-developed 'system' of internal communications. What is required is that the existing system is kept in a state of efficiency and then that it is expanded to meet growing demands.

With the need for a progressive expansion in the transport sector to meet the economic development requirements of the country and also with the pressing demands on the scarce resources of the country, it is necessary that a transport programme for providing economical and efficient transport services at charges related to expenditure should be provided at as low a cost as possible in terms of the real resources of the nation.

Integrated Planning

An obvious aspect of this goal is that it is necessary to adopt a co-ordinated transport policy. The different competing forms of transport, as we have seen, are rail, road, air, canal and inland waterways, and coastwise shipping. All these forms of transport in competition are mutually destructive, and unless integration was provided the very excellence of each system would lead to adverse economic consequences to the country. Integration must be designed to ensure that traffic will flow naturally along the particular channel of transport that suits it best, and for this purpose it is necessary to eliminate the two great evils of unnecessary duplication and wasteful competition.

The development of the various modes of transport needs to be planned in such a manner as to afford the maximum satisfaction of the transport requirements of the national economy at the lowest cost in terms of the nation's real resources, preserving, at the same time the elements of healthy competition, and the inherent advantages of each mode. Existing transport shortages are likely to be seriously aggravated by future demands of economic development. Transport capacity must therefore be expanded as quickly as possible. Transport should not only respond to the demands made on it, but be an instrument for furthering economic development.