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FEATURES

On The Kelani Valley Line

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The future of that 87 miles of narrow rail track that runs from Colombo—Fort, through the Kelani Valley, upto Opanaike has been the subject of much debate in recent times. Here I. S. Fernando, a keen student of transport discusses some practical solutions to the problems of the K.V. Line. Mr. Fernando, who served in the Transportation Department of the Railway for several years, was last the head of a newly created "Traffic Costing Unit" in the Railway. On his initiative many railway statistical systems were modernised in order to provide meaningful data to monitor the Railway's activities for in-depth studies and for traffic costing.

Whenever the future of the KV Line comes up for review, it immediately rouses widespread interest though the enthusiasm generated is not always matched with facts or meaningful analysis. The KV Line is a historical antiquity; its construction commenced in 1900, just 36 years after the first broad gauge train ran from Maradana to Ambepussa. It rapidly expanded during the early years of the century but started to shrink during the Second World War and again in recent years. In the Colombo commuter area the users of the KV Line are mostly Government servants who have their season tickets heavily subsidised by the Government and in the remote areas those who do not have ready access to road transport. These groups along with some non-users have clamoured for its retention and improvement. On the other hand, the pre-occupation of the operators, that is, the Railway, appears to have been centred almost wholly on the problem of procuring and maintaining an adequate set of rolling stock for service on the Line. The question of viability, or profitability, does not seem to have engaged the attention of any particular group seriously. This is understandable because in the context of a heavily losing Railway enterprise — the annual losses being in the region of Rs. 100 million — it could be argued that the losing lines of the Railway would not be the KV Line only and that this Line should be treated no differently, from the other losing lines.

There are, however, fundamental differences between the narrow gauge and the broad gauge which may not be widely known. There was, even in the pioneering years, a school of thought which opposed a two-gauge system and which successfully resisted the attempt to introduce a narrow gauge in the up-country even though the differences so noticeable now in the operation of a two-gauge system would not have been as evident then. When the KV Line was constructed as a narrow gauge, the Railway was supplanting the animal-drawn vehicle so that the new Line despite the handicaps did confer an advantage to transport users. Today, the situation has changed. The motor vehicle has encroached on the Railway preserves, and the differences between the broad and narrow gauge lines have become more marked than ever. The width of the narrow gauge is 2 feet 6 inches as against 5 feet 6 inches of the broad gauge. Its maximum permissible speed, that is, the maximum speed of trains permitted on the track, is only 20 m.p.h. as against 50 m.p.h. on the broad gauge. These differences under the operation of trains cause wide differences in output.

The average speed of a stopping passenger train is about 14 m.p.h. on the KV Line and about 25 m.p.h. on the broad gauge, and the passenger carrying capacity of a full length passenger train on the KV Line is about half the carrying capacity of a double power coach set. It is easily seen from this that for one train hour the broad gauge will produce 3½ times the passenger miles produced by the KV Line. This also means that, since the tariff is the same on both gauges, to produce the same revenue earning capacity on both gauges the train hours on the KV Line would have to be as much as 3½ times the passenger miles produced by the KV Line. The results are almost identical when considering the goods service though the values are different. This is an approximate value but it is sufficient to show that with regard to effort and output there is a wide gap between the KV Line and the broad gauge, a gap which cannot be bridged because of the limitations which have been built into the KV Line. Apart from the relatively high effort needed to earn revenue, its potential to attract traffic or to earn revenue is also low. Passenger traffic is not attracted to the KV Line because parallel road services are much cheaper for long distance travel and the services much faster. Goods traffic has been declining over the years and what is left-over now moves one-way, being mainly food traffic originating from Colombo. For economy in operation traffic must be two-way. Though there is traffic in the region it is not rail borne.

The KV Line — as it was until recently — ran from Fort to Opanaike, a distance of 87 route miles. It formed 9 per cent of the total route mileage or 12 per cent of the total track mileage, that is, the mileage of track available for the running of trains. But the train miles operated, the passenger journeys undertaken, and the goods moved did not exceed even 4 percent of the total. The train miles per track mile was less than half that on the broad gauge. There was, therefore, a serious under-utilisation of available track capacity.

The KV Line as it is now constituted has several unsatisfactory features and it would, therefore, be difficult to support a case to extend the KV Line as a narrow gauge. There are other matters requiring priority attention such as, for example, the situation in the broad gauge where goods traffic has been declining at an accelerating rate from 1970. From the all-time high figure of 228 million ton miles moved by Rail in 1970, it had dropped to 184.1 million ton miles in 1975 — a drop of 19 per cent in 5 years.

What then should be done with the KV Line, it may be asked. There are really five options. It will be useful — the reasons will become evident later — to break up the length Fort/Opanaike into Fort/Homagama and Homagama/Opanaike. The options are:—

I. **Closure of the whole KV Line;**
II. **Broadening the whole KV Line;**
III. **Closure of Homagama/Opanaike and operating Fort/Homagama as a narrow gauge;**

IV. **Closure of Homagama/Opanaike and broadening Fort/Homagama;**

V. **Operating Homagama/Opanaike as a narrow gauge and broadening Fort/Homagama.**

Closure of the whole KV Line would remove at one blow all the problems of operation but it would be a drastic solution paying no heed to social consequences and to the possible existence of less drastic alteratives.

Broadening the whole Line along the existeing track will only increase the payload capacity of trains. If the curvature of the track is retained and the speed remains unaltered this will bring in no advantage. The under-utilisation of track capacity will worsen if traffic does not increase in the same proportion as the increase of track capacity. Additional motive power and rolling stock will be required to provide a suitable service since these resources are scarce even now.

Even though the permissible speed is brought up to the level of the main line the KV Line will have to depend largely on goods traffic because long distance passenger traffic will still continue to patronise the cheaper road service. To broaden the KV Line the following conditions must, at least, he satisfied to start with.

> Additional locomotives and rolling stock to meet the entire needs of the service would need to be imported; the fare differential would have to be eliminated either by raising road fares or by lowering KV Line rail fares; the track must permit a speed of about 50 m.p.h for more than half the total distance; there must be a guarantee of sufficient goods traffic, say of more than one train load each way daily (about 340 tons make up one train load). The conditions of purchase and construction can only be attained at high cost. There will be difficulties to implement the conditions regarding traffic.

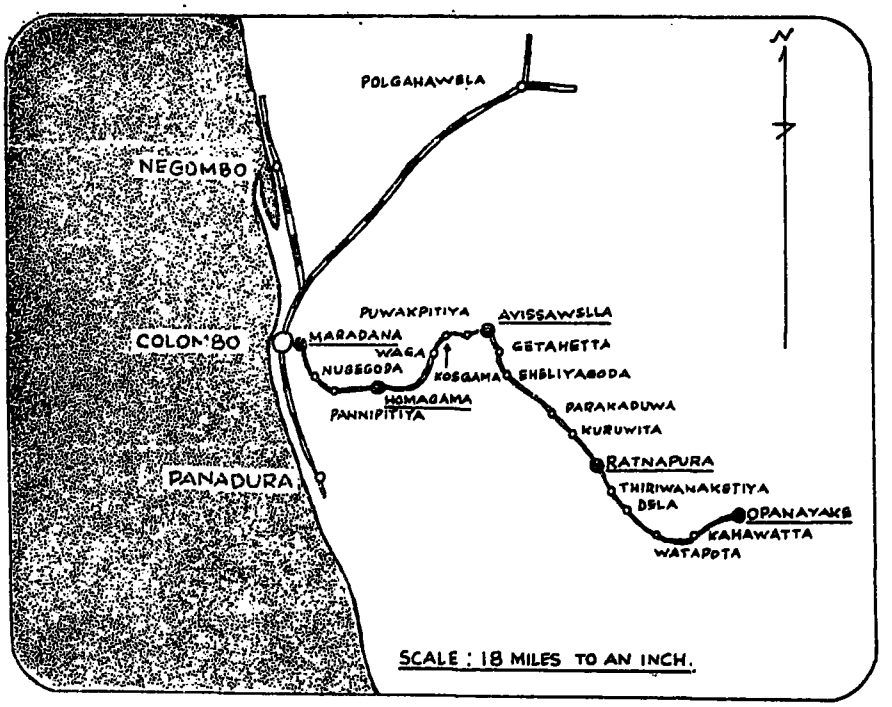
The fifth option will not work in the long run. Passengers will not put up with all the inconveniences which will result when having to change gauges and with the slow narrow gauge speed. The transport of goods at the break of gauge will delay goods and rolling stock, since labour intensive methods will have to be used. The third option is what the Railway is doing at present and this too is not a long term solution.

Broading the KV Line up to Homagama — the fourth option — will without doubt bring the level of passenger traffic up to the level of the other comparable suburban sections, namely, the sections Fort/Panadura and Fort/Gampaha, provided the speed and the services are right; and provided the Line keeps close to the present track. The revenue which will be earned when the traffic has come up to the level of the broad gauge suburban sections will probably cover the operating costs but not the capital costs. But to compensate for this there will be a saving in other areas as, for example, a saving in buses. The authorised load of a double unit power coach set is 1380 passengers which is equivalent to 23 buses with 60 passengers in each bus. Thus, one power coach train has the capacity for, say, 23 buses. There will also be savings in road congestion and pollution, and a saving in time to those who commute into and out of the KV Line area by rail or by a combination of rail and bus. If the Steel Factory at Oruwela which is about 2½ miles from Homagama is connected by rail and a reasonable goods load is assured then the Line could approach conditions of viability.

It will be necessary to import about 6 to 10 power coach sets to provide a satisfactory service. Since the service will have to be operated on single line and will have to serve traffic in both directions power coaches would be more suitable than loco-hauled trains. If the traffic in any one of the power coach trains exceeds its capacity then the question of replacing it by a loco-hauled train can be considered.

However, the decision to broaden the Line up to Homagama should not be based on the factor of viability but on important socio-economic grounds. The rail area encircled by Gampaha, Panadura and Jaela at a radius of about 16 miles from Colombo forms the Inner Suburban Area. There is heavy concentration of traffic within this area with a peak of about 2½ hours in the morning and a super-peak within it of about 50 minutes. The Railway is the best mode of transportation for such a concentration of traffic and to provide for future growth. The addition of Fort/Homagama to this Area is the next logical step to provide efficient transportation for commuters residing within it.

The whole project of broadening the KV Line could flounder if a reasonable speed cannot be attain-



The K. V. Line covers 87 miles of narrrow gauge rail track running from Colombo Fort via Homagama, Avissawella and Ratnapura to Opanaike. The diagram shows the areas by this Line serves and the possibilities of integrating it with the heavy rail traffic within the suburban sections of the Greater Colombo area.

COMPARATIVE TABLE OF SPEEDS AND DISTANCES

	Homagama/ Maradana	Gampaha/ Maradana	Panadura/ Fort
1. Route Miles	15	16	16
2. Time taken by best commuter trains (mins.)	77	51	51
3. Time allowed for stops (mins.)	12	12	12
4. No. of stops	12	12	13
5. Maximum permissible speed (m.p.h.)	20	50	50
6. Average speed, with stopping time (m.p.h.)	12	19	19
7. Average speed, less stopping time (m.p.h.)	14	25	25
8. Average length between stops (miles)	1.2	1.2	1.2

ed to operate a train service. The KV commuters will want a speed comparable to that enjoyed by the broad gauge commuters. The increase of passenger traffic as forecast cannot be attained unless a reasonable speed is assured. A comparative table of speeds and distances which is given above will reveal some points both useful and worthy of note.

On the broad gauge the average speed of operation for a stopping train is 25 m.p.h. though the maximum allowed is twice that speed. On the KV Line the average speed is much closer to its maximum value. The average distance between stops is the same in the narrow gauge and the broad gauge, being 1.2 miles. This low value acts as a constraint to the attainment of high speeds by stopping trains. A paralled situation operating in the Upper District can now be brought in for comparison. A commuter service operates between Kandy and Matale where the maximum permissible speed between Kandy and Katugastota (3.54 miles) is 20 m.p.h. and between Katugastota and Matale (13.83 miles) is 25 m.p.h., while the average speed, less stopping time, is 19 m.p.h. Thus high maximum speeds are not required by stopping trains.

It will be obvious that the maximum permissible speed should be higher than the present speed on the KV Line and, taking the example of the Upper District, it should be higher than 25 m.p.h. It has also been shown that the upper limit may not be as high as 50 m.p.h. Such a high speed is required mostly by long distance passenger trains running express and this does not apply to the Fort/Homagama section. Between these two wide speed limits lies a narrower range, which could be deduced.

The components of the total time taken by a train between two consecutive stops are:

Acceleration to steady speed;

Running at steady speed (that is, running at the maximum permissible speed);

Deceleration from steady speed.

Three acceptable assumptions will now be made to simplify the working. It will be assumed that deceleration which is faster than acceleration is twice the rate for acceleration and, secondly that the train should run a reasonable distance at the steady speed, say, for half the total distance between stops, that is, for half of 1.2 miles. Thirdly, a value for acceleration (See Footnote) will be assumed. It can now be calculated that the maximum permissable speed under these circumstances need not exceed 42 m.p.h. For speeds, say, of 42.4, 36, 30 and 24 m.p.h. the total time taken by a train under the same conditions, to cover the same distance between stops are 151, 163, 180 and 209 seconds respectively. These selected speeds have a 6 m.p.h. difference. The difference in the total time taken between 30 and 24 m.p.h. is 29 seconds while between 42.4 and 36 m.p.h. is only 12 seconds. As the speed increases the saving in journey time decreases. In the circumstances it may not be necessary to go as high as 42.4 m.p.h. Under the circumstances assumed the maximum permissible speed can lie between 30 and 36 m.p.h.

There is thus a clear case for broadening the line upto Homagama. The fact that it will be a single track will, if at all, be an impediment only to operations, but not to the development of traffic. The Steel Factory, is 2½ miles from Homagama. If the railway is extended to the factory it will be connected to the entire Railway System, to all its sources of raw materials and to its fuel supply.

Commuter traffic originates as a result of separation of dwellings from work places. If the area around terminals is developed with dwellings, say, upto a distance equivalent to journey time of about 20 minutes whether by bus, foot or both then that area has potential commuter traffic. The section Maradana/Bambalapitiya of 4.3 route miles is studded with work places. Most of the commuters on a morning detrain in this section. On the narrow gauge the work places are on the section Maradana/Narahenpita of 3.51 route miles. The total route mileage exposed to work places, with the broadening, will now be 7.90, say, 8 route miles. Again, the area upto Homagama has a high density of dwellings on both sides of the track and compares favourably with the coastline, which is exposed only on one side to rail influence, and to the Main and Negombo lines which run through sparsely populated areas. Because of the improved accessibility of work places in the Colombo region, there will be an increase in traffic not only in the broadened section but also in the other sections.

It may not be widely known that two-thirds of the total season ticket journeys undertaken in the Railway lie, that is, originate and terminate, in the area enclosed by Gampaha / Panadura / Ja-ela, of radius 16 miles from Colombo and of length 34 route miles. The traffic is self-contained within this area. Though there are 829 route miles opened for passenger traffic, the season ticket traffic is concentrated in this area of 34 route miles. The addition of the broadened line upto Homagama, which is also of 16 route miles from Colombo, will bring the total to 50 route miles. A satisfactory train service provided for this area will solve two thirds of the total season ticket traffic problem of the Railway. In any scheme to electrify the Railway System, priority should be given to this area first rather than, say, electrifying the stretch to Polgahawela, also about 50 rout miles from Colombo.