8. RAILWAY TRAFFIC COSTING CONCEPTS AND PRINCIPLES

The work programme for the ESCAP project on Railway Marketing includes the development of a computer based model to assist the costing of individual railway traffics, since it was considered essential that marketing managers and planners should have routine access to traffic-specific cost estimates in order to be able to devise marketing strategies, plans and actions aimed at improving railway financial performance. *Traffic specific costs are the costs which are incurred in moving passengers or freight by rail between a given origin and a given destination.*

In fact, there are other personnel within railway organizations who similarly need traffic-specific cost estimates. However, their needs are diverse. The nature of the cost estimates to be generated by the proposed model will therefore depend upon the objectives of all users or potential users of railway cost information, although the major emphasis will be on the needs of marketing personnel

8.1 Cost Definitions

Traffic-specific costs can be estimated on several different bases. *Estimates* are generally required because traditional railway accounting systems lack the capability to provide actual cost data to the required level of disaggregation.

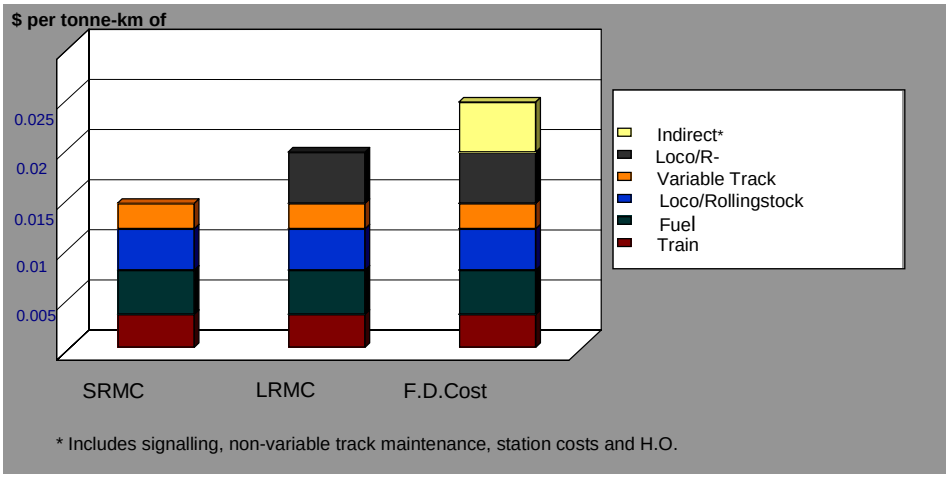
The three types of cost indicator which are normally estimated for point-to-point traffic are:

- ***Short Run Marginal Costs***. These are the addition to total costs within the short term (e.g.. within 12 months) resulting from the addition of small increments, such as one more tonne of freight, to total output. Since they include cost elements which will only vary in the short run, they do not include items of capital cost. Examples of short run marginal cost elements are the cost of train crews, fuel, locomotive and rollingstock maintenance, and incremental track maintenance needed to carry an extra tonne of freight, or an extra passenger.

- ***Long Run Marginal, or INCREMENTAL, Costs***. These are short run marginal costs, with the addition of other costs which will vary only in the long term (i.e. generally during periods of longer than 12 months). Thus the elements of long run marginal costs are those comprising short run marginal costs and any capital cost increments needed to support additions to output. One example of such a capital cost increment would be the purchase cost of new wagons needed to carry to carry additional freight tonnage, but if investment in infrastructure such as mainline or siding trackage, signalling, or telecommunications systems is required to support the costed traffic, then this also should be included.

- ***Fully Distributed, or Fully Allocated, Costs***. These result from the addition of overhead or indirect costs (i.e. costs which cannot be directly associated with, and do not vary in proportion to, output). The distribution of these costs to specific services and traffics is often controversial, as the basis of distribution is necessarily arbitrary, e.g. distribution in proportion to direct costs or to some physical measure of output, such as gross tonne-kilometres. The cost

associated with the provision and maintenance of a signalling system on a particular line and head office overhead costs are examples of indirect costs, requiring distribution to individual traffics.



The typical composition of these cost indicators is shown in Figure 8-1, using freight traffic as an example. Of course, the relative proportions of the cost constituents of these indicators is likely to vary considerably from railway to railway, but the example shown has been taken from a study of an actual freight service on an actual railway line in the region.

A particular form of indirect cost frequently encountered in railway operation is *joint cost.* This is the cost of providing two or more services, the production of which cannot be physically separated. That is, provision of a facility for one service will automatically make that facility available (up to the limit of its capacity) for all other services. The signalling system costs and the costs of railway head office administration, cited above, provide classical examples of joint costs. There is no reasonable basis on which joint costs may be allocated to any one service.

Another type of cost which is frequently encountered in railway operation is *common cost.* This is the cost of resources shared by more than one service, where the proportions of the resources allocated to individual services may be altered at the discretion of management. An example is the cost of train crews. The sharing of the costs of a given train crew depot among the various services operated by that depot is determined by the way in which crews are rostered for duty. In principle, it is possible to relate such costs to individual activities and services. Common costs are always of a “direct” nature, since the apportionment of indirect costs, such as supervision costs for train crew depots, will not be directly influenced by crew deployment decisions. Common costs are a major element of the short and long run marginal cost estimates described above.

Finally, another cost indicator frequently used as a basis for studying the financial and economic viability of operating individual lines or other sub-divisions of railway networks is *avoidable cost*. This is the cost which would be avoided or would not be incurred if a service ceased to be provided. For example, if a station on a particular line were to be closed, the costs of maintaining that station would be avoided, but the costs of staffing that station would not be avoided, unless the staff were completely separated from the railway organization, through retirement, resignation, or other means of severance.

8.2 The Need of Railway Organizations for Traffic Specific Cost Estimates

The principal users of railway cost data and the nature of their requirements may be identified, as follows:

- ***Railway Corporate Managers*** (i.e. General Managers, Deputy/Assistant General Managers) are likely to require estimates of long run marginal, short run marginal and fully distributed costs by traffic or market segment, to enable routine monitoring and control of costs and revenues at the enterprise and sub-enterprise level as well as to provide a basis for negotiation of *Public Service Obligation* (PSO) contracts with the government. Users in this category are also likely to require estimates of *Avoidable Cost,* by individual service, line or other subdivision of the network, as a basis for making decisions about strategic withdrawal from individual services, lines or subnetworks.

- ***Railway Corporate Planners*** are likely to require the same types of cost estimates as Corporate Managers, but for the purpose of formulating goals, targets, strategies and action plans, at the enterprise and sub-enterprise level.

- ***Railway Marketing or Commercial Managers,*** as suggested earlier, are likely to need access to estimates of long run and short run marginal costs (LRMC's and SRMC's) by individual service (i.e. between given origin and destination, individual customer account and individual market or traffic segment. These estimates are needed as a basis for decisions about: acceptance of new business; changes in tariffs, service levels or traffic handling; setting of terms and conditions applying to long term haulage contracts (freight traffic); and setting of terms and conditions applying to contract passenger business.

- ***Transport Policy Makers and Planners*** (e.g.. Ministry of Transport officials) are likely to require long and short run marginal costs, possibly fully distributed costs and avoidable costs by traffic segment and network sub-division, in order to undertake policy formulation - particularly in relation to PSO contracts for the subsidization of unprofitable services and to ensuring an equitable distribution of resources among competing transport modes.

The development by ESCAP of a traffic-specific costing model will have to take into account the needs of these and any other users of railway cost data.

8.3 Problems Typically Encountered in the Development of Railway Cost Models

Some of the region's railway organizations have already made considerable progress with the introduction of computer based *traffic costing models* which will ultimately improve their capability to manage individual traffics in conformity with the achievement of corporate financial goals. However, the majority of these organizations have experienced problems arising from the fact that the accounting systems which provide the base data for their models are mostly designed to satisfy the reporting requirements of governments at the macro level, and hence are not suited to providing disaggregated cost data to the level of individual services and specific operating resources.

In other words, existing accounting systems do not generally have a "job or activity costing" orientation, whereby, for example, the costs associated with operating a particular train

between a given pair of stations can be provided as a routine information output. This disability is often compounded by the lack of any direct link between physical operating records which provide the necessary dissection of activities and the accounting systems which do not.

Further, while the traffic costing models which have so far been introduced operate on personal computer spreadsheet software, they are large and complex, and have proven difficult to update with recent cost data.

There is also a risk that the costing systems and methodologies being introduced might not be compatible with one another, presenting a possible obstacle when the railway organizations of neighbouring countries have to jointly appraise international traffic opportunities.

The purpose of the traffic costing element of the ESCAP Railway Marketing project is therefore to develop a personal computer based model which will allow estimation, on a *consistent basis throughout the region*, of the costs of carrying freight or passengers between a defined origin and a defined destination. The model will be designed to accept base data inputs from disparate sources, such as cost accounting systems, payroll records, and operational records, but to organize and apply this data in such a way that unit cost estimates may be generated on a consistent basis irrespective of the data source used.