THE PLANNING PROCESS IN INDIAN RAILWAYS
CHAPTER - III
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3.1 THE PLANNING ORGANISATION

3.1.1 In the Railway Board's Office the planning organisation is headed by a Director, Railway Planning, who reports to the Chairman, Railway Board. He functions in close coordination with other Directorates.

3.1.2 Planning Directorate comprises of Corporate Planning Cell, Transport Planning Cell and the main Planning Directorate.

3.1.3 The Corporate Planning Cell is manned by 4 Joint Directors, viz. Joint Director Corporate Planning (Traffic), Joint Director Corporate Planning (Civil Engineering) and Joint Director Corporate Planning (Civil Engineering) and Joint Director Corporate Planning (Signal and Tele.), assisted by Technical Assistants. Their function is to prepare the Corporate Plan for the Indian Railways, in consultation with Zonal Railways. The Corporate Plan gives a long-term perspective for 15 years.

3.1.4 Transportation Planning Cell is headed by an Additional Director (Transport Planning) assisted by a Deputy Director (Transport Planning)
Planning) and a few Technical Assistants. The main function is to examine rail transport requirements of big industrial units and clear them from rail transport angle.

3.1.5 In the main Planning Directorate, there are presently two Joint Directors. Schematic Diagram of the organisation is given on the next page. The functioning of the Planning Directorate are given below. Within the overall National Plan the rail transport needs of all the Ministries and also the overall resource availability has to be taken into account. In doing so it has to coordinate with other Ministries/Organisations of Government of India and also with other Directorates of the Railway Ministry itself and the Zonal Railways, so that the funds allocated by the Planning Commission are equitably distributed under different plan heads and among different railways. In fact, all coordination with the Planning Commission on behalf of all Directorates is effected through this Directorate, e.g. asking for additional funds, seeking Planning Commission's approvals to schemes for setting up of workshops, construction of new lines etc.
ORGANISATION CHART OF PLANNING DIRECTORATE

D.R.P. = DIRECTOR RAILWAY PLANNING
D. = DIRECTOR
A.D. = ADDITIONAL DIRECTOR
J.D. = JOINT DIRECTOR
O.S.D. = OFFICER ON SPECIAL DUTY
D.D. = DEPUTY DIRECTOR
R.P. = RAILWAY PLANNING
T.P. = TRANSPORT PLANNING
T. = TRANSPORTATION
M.E. = MECHANICAL ENGINEERING
C.E. = CIVIL ENGINEERING
S&T. = SIGNAL AND TELECOMMUNICATION

FIGURE 1
3.2 FUNCTIONS OF PLANNING DIRECTORATE

3.2.1 Annual Plan & Mid-term Review

Having formed the 5-year Plan, this Directorate has to prepare the Annual Plan and reassess the Plan in mid-term to correct the Plan.

3.2.2 Monitoring the Plan Progress

Monitoring the progress of the Plan is done for its proper implementation. It requires constant coordination with different Directorates and with different Railways.

3.2.3 Dialogue with the World Bank

As the financing of Railway Plan from World Bank loans increased, all dialogue with the World Bank has been entrusted to this Directorate. Not only are the loans negotiated through this Directorate, but all discussions with the various World Bank Missions take place through the Director, Railway Planning. All the data required by the World Bank for making appraisal of the various schemes to be included for the credit etc. has to be furnished by this Directorate.

3.2.4 Corporate Planning

The Corporate Planning Cell was set up at the behest of the World Bank for formulating
Railways' Corporate Plan for 15 years. This Cell brought out Indian Railways' first Corporate Plan covering the time horizon from 1973-74 to 1988-89. The Plan has now been under revised to cover the period 1986-87 to 2000-2001.

3.2.5 Transport Planning

3.2.5.1 The Transport Planning Cell undertakes Commodity Transport research for such of the commodities which move in bulk, e.g. Coal, Iron and Steel, Foodgrains, etc. Presently studies for bulk movement of cement and fertilisers are on hand.

3.3 ON ZONAL RAILWAYS

3.3.1 On the Zonal Railways, the planning function is the responsibility of Chief Planning Officer and he is supposed to coordinate the planning process on the Railway. In major departments there are separate planning officers who formulate proposals for their respective departments and it is then the job of the Chief Planning Officer to coordinate such departmental plans. However, since the planning organisation under Chief Planning Officer has been created some time ago only, this is yet to establish
itself fully. He is assisted by a Deputy Chief Planning Officer.

3.4 THE PLANNING PROCESS

3.4.1 The Railways' Five Year Plans are drawn up in the framework of the national five year plans. These are based on the estimates of demands for rail transport which, in turn, are assessed in the light of growth/output in major sectors, like coal, steel, foodgrains, fertilisers, petroleum products, etc. Railways requirements are grouped under the Plan Heads given in Annex I.

3.4.2 The Railway Plan is financed partly from funds internally generated and partly by budgetary support provided by the Central Government.

3.4.3 Railway Annual Plan has two components:

a) Rolling Stock Programme (RSP)

RSP is drawn up and finalised by Railway Board on the all-India basis. The assessment of the total requirement of wagons, coaches and locomotives is done by estimating the requirements on replacement account and on additional account (i.e. for catering to the needs of the additional traffic).
b) **Annual Works Programme**

To ensure proper scrutiny, budgeting for capital expenditure in the Railways is a continuous process rather than a seasonal exercise for the 'Works Programme Period' of 2-3 months. The existing procedure envisages scrutiny of the Works Programme proposals (i.e. proposals involving investment decisions) at various stages; it is briefly summarised below:

i) As a preliminary step, proposals which are individually anticipated to cost Rs.50 lakhs or more are subjected to a scrutiny before they are cleared for inclusion in the Preliminary Works Programme.

ii) Such works together with other works costing less than Rs.50 lakhs which get included in the Preliminary Works Programme of various Zonal Railways and Production Units are thereafter examined individually and briefs prepared for discussion at the Annual Works Programme meetings at which the G.Ms and FA & CAOs of
various Zonal Railways and Production Units participate.

iii) After the discussions during which tentative decisions are taken regarding dropping of the works as also modifications of the proposals, the proposals from the Railways get recast and are sent to Railway Board later in the shape of Final Works Programme.

iv) The Final Works Programme when received is scrutinised to ensure that the proposals reflect fully the decisions taken during the Works Programme meetings. A critical examination of those proposals which were agreed to for inclusion in the Final Works Programme on tentative basis, subject to the Railways furnishing more informations/fuller justification, is also carried out at this stage.

v) Thereafter, works individually costing more than Rs.50 lakhs are required to be processed for the M.R's personal approval before inclusion in the Budget.
3.5 SURVEYS

3.5.1 All projects of construction of new lines and major traffic facility works, costing more than Rs. one crore individually require to be preceded by a survey before being considered for sanction. For this purpose, a full fledged survey organisation is in existence on each Zonal Railway. Whenever a new survey is proposed to be undertaken, it is examined, inter-alia, with reference to:-

i) whether prima-facie adequate justification exists for the survey and the likely project work that it may lead to; and

ii) whether the project work which may result from such survey will be possible to be executed within the overall availability of funds in the foreseeable future, so that survey reports are not required to be updated, when conditions permit taking up the works.

3.6 CORPORATE PLAN

It is a long term plan for 15 years. It is prepared for each Zonal Railway and then a consolidated corporate plan is prepared for Indian Railway. The details regarding the Corporate
Framework of Indian Railways and British Railways are given in Annex II & III respectively.

3.7 INVESTMENT APPRAISAL IN INDIAN RAILWAYS-GUIDELINES

3.7.1 Types of Investments

Railway investments falls under the following categories:-

i) New lines - project-oriented or general purpose.

ii) Modernisation of traction, such as electrification and dieselisation.

iii) Line capacity works
   a) Gauge conversion
   b) Doublings
   c) Major signalling schemes (CTC, Route Relay inter-locking, etc.).
   d) Lengthening of loops or provision of additional loops
   e) Crossing stations
   f) Other line capacity works (Tokenless block, Automatic signalling).

iv) Yard remodelling and terminal facilities.

v) Microwave and other telecommunication works.
vi) Workshops
   a) Production Units
   b) Repair Units

3.7.2 Appraisal in General

In any investment appraisal, the costs and benefits are matched against each other, to see whether the net benefits add up to give the required return on investment. The type of benefits that result from a project would depend upon the nature of the project, but broadly, the net gain is either savings in cost or additional revenue or a combination of both. Cost savings result from operational improvements, such as savings in fuel cost because of superior traction or savings in rolling stock due to reduced turn round. Increased revenue could arise from newly generated traffic diverted from road or other competing modes. The magnitude of the benefits, whether earnings or savings, would depend upon the nature of traffic (high-rated or low-rated) as also on the lead over which it is carried.

3.7.3 Return on Investment

3.7.3.1 In the past, the financial remunerativeness of major railway projects used to be tested under the conventional method where the return
was calculated at specific points of time (1st, 6th, 11th and 16th years after completion of the project) and was compared with 6.75% which included dividend payable to the General Revenues at the rate of 6.5%.

3.7.3.2 For investments costing Rs.20 lakhs and above, the return is worked out over the life of the project using the DCF Technique. The cut-off rate of return under DCF is kept at 10% which represents the opportunity cost of capital in the country. A higher return is considered necessary to improve the financial viability of the Railways and to generate sufficient internal resources.

3.7.3.3 Under DCF, the analysis has to be carried out at (i) cost of capital to the Railways and (ii) cost of capital to the economy. Financial cost to Railways takes into account merely the Railways' cost and benefits relating to the investment under consideration. The real cost to the country in terms of the impact of such investment on the scarce resources of the country - imported equipment, diesel oil and power in particular - is not adequately reflected in an analysis which considers the railways'
own gains or costs valued at market prices. The economic cost, i.e. cost to economy, is theoretically determined by making three types of adjustments:

i) by omitting all taxes, levies and subsidies which are in the nature of transfer of funds from one sector of the economy to the other;

ii) by making allowances for other distortions arising from rigidities and imperfections of the price system; and

iii) by adjusting the market price of such commodities to reflect their scarcity value for the country.

3.7.3.5 In practice, it has been found that the computational effort involved in isolating all taxes and duties is not worthwhile from the point of view of sensitivity of the end results to such adjustments. Thus, the only adjustments that need to be made are in respect of fuel (diesel and power) and labour. For diesel oil the taxes are isolated first and to the tax-free price (which would have been the cost to the economy, had there been no foreign exchange difficulties), half the excise duty is added back on an ad hoc basis to reflect the foreign
exchange scarcity. Power is taken at the cost of generation and transmission. The cost of generation depends upon the percentage of hydel and thermal power likely to be in use on the project section. Although there may be a case for shadow-pricing of labour considering the state of unemployment and the relatively high level of wages obtaining in the economy, adjustment in respect of labour market is not recommended till the shadow prices for labour are known and laid down by the Government for purposes of project evaluation.

3.7.4 Traffic Forecast

3.7.4.1 A reliable traffic forecast is generally the first step in the assessment of the benefits accruing to any project. Detailed instructions already exist on the method of estimating the traffic likely to be carried over a new line. These may continue to be followed with suitable changes in detail or emphasis, on all projects which require an estimation of the traffic. The following points are important in this respect.

i) The traffic estimate for the base year must ordinarily be for each commodity from the point of origin to the point of destination;
ii) A study of the availability of other modes of traction, the relative advantages of the competing modes of transport, traffic structure, user's preference, cost of haulage, future plans of development, etc., has to be made before the Railways share of traffic offered can be estimated. Only such of the traffic should be taken into account as would be carried economically and efficiently having regard to its lead, physical characteristics and value. For instance, bulk commodities like coal, iron and foodgrains may be safely assumed to be available for transport by rail, while high valued commodities such as medicines, textile goods and general merchandise would gradually divert or continue to be carried by road.

iii) Specific additions to traffic generated due to establishment of new industries should be treated separately as a superimposed item rather than being merged in the aggregate traffic. This would make for sensitivity analysis to be carried out on
the effect of total or partial feature of predictions of the additional traffic.

iv) To estimate the rate of growth of traffic, the usual techniques of regression and correlation can be applied to past available data, as adjusted for changes in the foreseeable future. Where such data do not exist (e.g. in the case of new lines), the rate of growth observed in the region may provide some indication of the likely growth of traffic on the new line. It is safer to err on the conservative side in traffic estimation. Long-term projections on the basis of data for too short a period may give rates of growth which might not endure and should be guarded against.

v) Traffic projections will have to be made over the life of the investment which may extend up to 40 years. For practical purposes and to be conservative, the traffic may be assumed to stabilise around the middle of the period under consideration or even earlier. This would partly take care of the uncertainty regarding growth of traffic in the distant future. In any case the arithmetical
process involved in discounting future receipts also helps to reduce the escalatory effect of compounding to some extent.

3.7.4.2 In estimating the likely passenger traffic, past data and the growth rate will be relied upon where such services already exist, but where services are to be introduced anew the process of estimation has to take into account the population involved, the number of towns and villages served by the line, the adequacy of the road services and its growth, and so on. A very rough idea of the magnitude of such an estimate can be had by comparison with an existing section where conditions are similar.

3.8 METHODOLOGY FOR SPECIFIC INVESTMENTS

3.8.1 New Lines

3.8.1.1 Areas chosen for construction of new lines are those that appear promising in terms of initial traffic potential and possibility of future growth. Construction of new lines is not, however, undertaken as a matter of course whenever traffic prospects are encouraging. In the context of the integrated development of the transport services in the country, the railways'
internal programme of expansion has to be considered as part of the overall optimal planning of the infrastructure facilities. Thus, today the broad principle that underlies the expansion of the railway services in an area is that the introduction of such a service will not duplicate or result in avoidable competition with other modes of transport and judged from the point of view of inter-modal allocation of resources, rail facilities would meet the transport requirements of the area best or are needed to supplement the existing system.

3.8.1.2 The benefits to the railway organisation resulting from the construction of a new railway line, in financial terms, consist of the following:-

i) revenue from generated traffic, freight as well as coaching new traffic and diversion from road and other competing modes. This benefit will accrue on project line as well as existing lines;

ii) Savings resulting from short-circuiting where the new line reduces the distance between two stations-reduction in cost of haulage and savings in rolling stock due to reduced transit time.
Estimation of new traffic will be made broadly on the lines indicated earlier. In the case of savings due to shorter haul, the earnings lost because of reduced lead will also have to be taken into account.

3.8.1.3 The expenses relating to a new line will have to be calculated under each head of expenditure such as maintenance of structural works, supply of locomotive power, repairs and maintenance of rolling stock, traffic department, electrical department, signalling and telecommunications department, etc. The reason for building up these costs from scratch is that for new lines, the system averages applied to the relevant bases may result in under-estimation of costs and greater degree of accuracy can be brought to bear upon cost estimates by analysing them threadbare.

3.8.1.4 Cost of haulage on the existing lines will be based on the system averages for the railways concerned. For this purpose, the variable elements of unit costs worked out for each facet of operation (terminals, linehauls, marshalling en route), maintenance of tract and signalling, etc.) are to be adopted, the costs relating to
provision of rolling stock being taken care of separately. Alternatively, these costs may also be worked out by elements e.g. staff, fuel and lubricants, repairs and maintenance and so on. Since for the existing lines, the relevant costs are the incremental costs of moving the traffic, any investment required to augment capacity anywhere on the system to carry the anticipated volume of traffic has to be debited to the project. Where such costs cannot be estimated with reasonable degree of accuracy, it is safer to confine the benefits on the existing line to the jurisdiction of the railway concerned.

3.8.1.5 In so far as new railway lines are concerned the alternatives for the railways are: (i) to construct the line and earn the revenue or (ii) to forego the expected earnings by deciding against the investment. A decision will depend upon whether the net earnings expected to accrue give the required rate of return over the life of the line. But the choice for the country will depend not upon the railways' profitability which is dependent on the freight structure but on the cheapest mode of carrying the projected traffic. A comparison of the railway costs with the cost of moving the
traffic by road or other modes is involved from the point of view of the economy.

3.8.1.6 In the economic sense, the treatment of revenue would be different. Strictly speaking, the benefit of the investment in new lines should be estimated in terms of the net addition to the national income. However, except in a few cases of project oriented lines, this may not be possible due to non-availability of data on the unutilised factors of production in the command area of the line, extent of diversion of resources from other areas, cost of other infrastructure necessary for economic growth and so on. The most practical approach would be to treat the gross earnings on freight and passenger traffic as a measure of the utility of the new facility to the rail users. Indeed, this may indicate the lower limit of the utility where it does not take into account the consumers surplus accruing to many rail users who would be prepared to buy railway transport at a higher price rather than do without it. The loss of earnings to the railways resulting from short-circuiting of the route or reduction in distance would not represent a cost to the
economy as the rail users would stand to gain through reduction in freight charges. This would mean that the gains and losses within the economy neutralise each other. Where, however, alternative modes of transport such as road transport or coastal shipping are already available in the command area of the new line, the benefit to the economy will be restricted to the saving in the cost of movement made possible because of the provision of the railway line.

3.8.1.7 The cost by road will have to be worked out by means of norms relating to speed of vehicles, pay load, utilization, costs of operation, repairs and maintenance of vehicles and of roads. The State Transport Corporations and the Ministry of Transport will have to be relied upon to furnish the cost norms for movement by road. Since the costs to be considered are those relating to the economy, taxes will have to be ignored and due adjustment should be made to imported equipment, price of oil, etc., as explained earlier. While roads already constructed will be sunk cost for the purpose of such an analysis, the costs of construction of additional roads will have to be included.
3.8.2 Dieselisation and Electrification

3.8.2.1 Dieselisation is normally considered when there is a problem of line capacity under steam traction. The improvement in capacity is usually limited to 10% to 12% in terms of path, but because of bigger haulage capacity of diesel locos, the throughout can be increased by as much as 50%. The advantage of dieselisation improves with the distance of the section from coalfields. In fact, justification for dieselisation is almost independent of the level of traffic, provided the distance from coalfields is sufficiently high and the volume of traffic is enough to form full train loads as the diesel loco can haul.

3.8.2.2 As compared to dieselisation, electrification improves capacity by an additional 3% to 5% while the haulage capacity of electric locos is more or less comparable to diesel, except when the section is heavily graded. The real advantage of electrification over dieselisation is, therefore, in savings in the working expenses and because of the heavy initial investment involved in electrification the traffic level has to be sufficiently high (8 to 10 million GTKMS) to justify electrification. Dieselisa-
tion may, therefore, be looked upon as an intermediate stage of electrification. Only such stretches should be considered for electrification which form part of the important trunk routes and fit in with the perspective plan for electrification, since isolated stretches will not bring in the full advantages of electrification.

3.8.2.3 In an economic study involving choice of traction, the approach is to compare the cost under alternative modes of traction and to arrive at the least cost solution. The alternatives considered are normally the following:

i) Full Steam

ii) Mixed traction (steam and diesel)

iii) Full dieselisation

3.8.2.4 The revenue benefit is common to all the alternatives since it is assumed that the expected traffic volume has to be carried any way. Since the cost set up is comparative the common costs like common benefits of revenue need not enter the analysis. Thus, the costs to be considered are:-
A) Capital Costs

i) Capital cost of electrification/line capacity, if any, under steam or dieselisation;

ii) Rolling stock;

iii) Loco shed facilities

B) Operating Expenses

i) Fuel and lubricants.

ii) Repairs and Maintenance:-  
   a) Rolling stock;
   b) Overhead equipment and substation

iii) Staff - Running, train and shed staff.

Such operating expenses as are independent of traction such as terminal expenses, miscellaneous transportation expenses, maintenance of track and signalling, etc. can be ignored. Provision and maintenance of wagons is included in the cost because of the likely improvement in turn-round due to higher speeds under superior traction.

3.8.2.5 The total discounted present worth of costs (capital and operating expenses) at 10% will bring out the least cost solution. The internal rate of return (IRR) can be found out on a trial
and error basis by discounting the costs under the best and next best alternatives.

3.8.3 Line Capacity Works - Gauge Conversion

Selection of Sections

3.8.3.1 The rail sections selected for gauge conversion should be such as would promise to yield a reasonably high return on investment. Generally the following criteria may be applied to identify such sections:

i) The density of freight traffic should be sufficiently high, say, about 2 million tonnes per route km per annum for MG single lines. Since saving in BG operation over MG in respect of passenger traffic is not of a high order, sections where passenger traffic is predominant do not generally qualify for gauge conversion on economic considerations.

ii) Gauge conversion should hold out the possibility of substantial reduction in the volume of transhipment. In many cases, it involves establishment of additional transhipment points or at least shifting of the existing transhipment points. If the traffic at the existing transhipment point
is mostly for the MG section being considered for conversion, saving due to reduction in transhipment will add to the justification for conversion.

iii) The track capacity of the MG section should have reached near-saturation limit calling for augmentation in a big way by such measures as introduction of CTC, doubling, improvement in signalling, etc.

iv) The traffic carried for the MG line should have a high growth potential. This would depend on the economic development of the areas served by the line as also future plans for growth and development in the industrial, agricultural, mineral and other economic sectors.

v) The sections considered for gauge conversion should not be isolated stretches selected on ad hoc basis but should fit in with the perspective plan for conversion. This would imply that preferably those sections deserve consideration which form part of the main lines or traffic routes serving important centres of trade and industry.
vi) MG Sections which after conversion into BG are expected either to provide an alternative route to the existing saturated route or a short-circuited route for a sizeable volume of traffic should receive due consideration.

vii) The section considered for conversion should not be too small, except for purposes of linking two otherwise isolated BG Systems.

3.8.4 Traffic Forecasts

3.8.4.1 While the broad guidelines laid down earlier apply to conversion studies also there are some important points which have to be taken note of in such projects. Gauge conversions often lead to large scale diversion of traffic from the existing BG routes to the new BG route where the former are either longer or saturated. Similarly, some traffic gets diverted from the existing MG route to other all MG routes to avoid two transhipments. These diversions involve additional cost to the system. It is, therefore, necessary that the diverted traffic of both the types is separately estimated so that the costs saved as well as additional costs incurred are duly accounted for. Again, traffic
expected to be diverted from other modes of transport to the newly converted section or generated purely by virtue of the availability of BG should be separately estimated. Where gauge conversion is viewed as a measure to augment track capacity, the former category of traffic is not relevant to the analysis as the same would also be available for the alternative of MG doubling. In other cases, some traffic is expected to be generated with the provision of BG due to reduction in transit time of consignments, elimination of transhipment and thefts and pilferages.

3.8.4.2 The alternatives to be considered in the case of gauge conversion are:-

i) Conversion from MG to BG,

ii) Doubling or other line capacity measures on MG.

For either of these alternatives, additional investments to augment capacity such as CTC improvement in signalling, etc., may also be considered simultaneously. Doubling may be in patches or total doubling. The various combinations of traction (steam, mixed
traction, dieselisation) will also be involved, so that alternatives will correspondingly be multiplied.

3.8.4.3 Benefit to the railways on conversion of a section from MG to BG will be the following:-

i) New traffic being offered to the Railways because of conversion; and

ii) Savings due to conversion.

New traffic to be taken credit for will be such traffic as will not come to the system unless the section is converted from MG to BG. This category as already mentioned may be wholly or partly traffic diverted from roadways now taking advantage of movement free of transhipment en route. Savings result from (i) the advantages of BG operation which is generally, though not necessarily always, cheaper and (ii) savings due to avoidance of transhipment, i.e. savings in handling costs and in rolling stock because of reduced detention at transhipment points.

3.8.4.4 The cost of the various alternatives will be:
a) Capital Costs
   i) Capital costs of construction (BG)/
      Cost of doubling MG and of relaying
      existing MG,
   ii) Rolling Stock - locos wagons and
      coaching vehicles,
   iii) Loco Sheds - Cost of provision.

b) Recurring expenses
   i) Fuel and Lubricants,
   ii) Staff - Running, train and shed,
   iii) Repairs and Maintenance
      a) Track & Signalling
      b) Locos
      c) Wagons
      d) Vehicles
   iv) Transhipment

3.8.4.5 The least cost solution will be determined
by discounting the cashflows at 10%. The
worthwhileness of the best alternative should
also be judged in terms of the internal rate of
return (IRR) which is the rate of discount
equalising the discounted present values of the
cashflows corresponding to the best and the
next best alternatives.

3.8.4.6 While calculating the cost to the economy,
the cost of carrying the additional traffic by
competing modes such as road transport or coastal shipping should also be estimated to guard against the misallocation of traffic among the various modes.

3.8.4.7 Other Line Capacity Works

Apart from gauge conversion, doubling and other major works, there are various minor works also which are less expensive and meet the short-term requirements of traffic without entailing under-utilisation of capacity. Examples of such works are Centralised Traffic Control, Route Relay Interlocking, Crossing Stations, lengthening of loops, etc. The methodology of project appraisal for such work may be, by and large, the same as discussed earlier.

3.8.5 Yard Remodelling

3.8.5.1 One of the important line capacity works is the remodelling of marshalling yards. Unlike the works for increasing the section capacity investments in yard remodelling are not very lumpy. This is because yards generally admit of gradual expansion by provision of additional sidings, shunting necks, shunting locomotives, cross-overs, water-columns, etc. Problems arise where the expansion of a yard is constructed by
built-up areas river or hills situated in proximity or where the traffic is expected to increase to such an extent that the continued patch-works on the existing yard might not be able to meet the requirements or they might make the yard operation uneconomical. The following are some of the important guidelines to be followed in case of large yard remodelling projects:-

i) The existing workload of the marshalling yard should be analysed along with that of other yards on contiguous sections so as to see if improvement in operational practices or re-distribution of the total marshalling work amongst the different yards will enable postponement of remodelling or reduce the scale of investment;

ii) The benefit of yard remodelling may be quantified in terms of the savings in rolling stock and working expenses not only in respect of the existing level of traffic but also that anticipated during the project life. Further, these savings would consist of: (a) savings within the yard; and (b) savings outside the yard, i.e. over rest of the system. The latter would
include detention to train on account of the formation of long queues (which may be assumed to be finite) and/or the additional rolling stock required to be put in service to divert the traffic to the longer routes in order to circumvent the bottleneck yard;

iii) Where yard remodelling is viewed purely as a cost-reducing measure, caution should be exercised in taking credit for the savings in the detention of wagons within the yard. This is because the saving in time due to speedier marshalling operations may only be wasted in the yard itself for want of justification to run additional trains more frequently with shorter loads.

iv) The requirement of locomotives for shunting within the yard and hauling trains on the contiguous sections should be worked out in the context of yard remodelling for the different levels of traffic expected during the project life and duly taken into account. If this is not done the additional capacity created in the marshalling yard may not be utilised leading to idling of assets;
v) The worthiness of yard remodelling project may be expressed in terms of the Internal Rate of Return both at financial cost as well as cost to economy.

3.8.6 There are certain railway projects, which present formidable problems in the evaluation of their benefits. For instance, promotion of safety due to installation of improved signalling equipment, reduction in the journey time of passengers due to speeding up of trains, efficiency in train control achieved through sophisticated tele-communication system and so on, are extremely difficult to quantify. Economic appraisal of such projects will have to wait till such time as suitable norms for quantifying these benefits are developed.

3.8.7 Methodology

Methodology followed in processing and financial appraisal of railway projects:

3.8.7.1 In accordance with the basic principle followed in the Railways, all expenditure incurred on new assets or on improvement of existing assets, except those in the nature of unremunerative operating improvements, should be financially justified, except when it is chargeable to ordinary revenue, or when it is
incurred on a statutory obligation in consideration of safety or to provide amenities to staff or railway users.

3.8.7.2 The net gain expected to accrue from a project may be either by way of savings in the existing expenditure or increase in the net earnings (i.e. gross earnings less working expenses) or a combination of both. Mode of assessment of the gain will, however, vary with project, depending upon its nature and objectives.

3.8.7.3 New Lines

Normally, new lines can be justified only if the net earnings expected to accrue from the project give a fair return on the anticipated investment. Ordinarily, no saving in the existing expenditure can arise as a result of the construction of a new line, except when it forms a chord line short-circuiting a previously existing route. Therefore, the additional traffic earnings expected to accrue on or because of the new line have to be very carefully assessed and also the operating expenses so as to arrive at the net earnings. In assessing the additional traffic likely to move
on the main line from and to points on the branch line, credit is taken only for that portion of such traffic which would not have been carried on the main line but for the construction of the branch line. Usually, these studies are undertaken through a proper engineering-cum-traffic survey by a team of competent officers at administrative level in which a Finance Officer of appropriate level is also associated.

Line Capacity Works

3.8.7.4 The justification has to be made either solely on the basis of saving in expenditure (usually by avoidance of detention of stock) and/or improvement in efficiency, or by a combination of these with the earnings from additional traffic. Usually, in such cases, the requirements of traffic are projected on the basis of a longer perspective of say 5-7 years, which might justify the proposed improvement financially. In fact, under the commonly used modern technique and cost effective analysis, it is permissible and even essential to work out the anticipated benefits over a longer period if not indeed the entire life of the project.
Preparation of the Project Estimate

3.8.7.5 The financial return from a project depends on the quantum of net revenue vis-a-vis the initial investment. It is, therefore, important that estimates of the initial investment are reliable and firm. It is an important part of the exercise of financial appraisal of a project to test that the estimates for the projects are complete and have been prepared with due care.

3.8.7.6 The earnings expected from additional traffic whether on the existing line or the new line are expected to be very carefully estimated in the Traffic Survey Report. The earnings lead from its origin or source upto the point of termination of the traffic over the respective zonal system. It is supposed to be ensured that in case consequential line capacity/works are required on Railway system, the project estimate takes note of such additional works.

3.8.7.7 In the case of savings caused in engine days or wagon days, etc., by avoidance of detentions of stock, the financial justification should be worked out on the basis of increased locomotive or wagon utilisation and consequent postponement of the purchase of new
engines/wagons, if such savings can be definitely secured, and not on the basis of the earning capacity of the stock saved. The savings in wagon hours/engine hours is to be assessed for the entire operating section, usually from one marshalling yard to another; otherwise there is the danger that the bottleneck is merely shifted from one point on the route to another point.

3.8.7.8 The cost of haulage of additional traffic is worked out on the basis of unit cost data compiled by the costing cell of the Railway Board's Office for each functional group of service. Cost of additional rolling stock required to carry the anticipated additional traffic is also estimated and added to the initial capital cost of the scheme for the purpose of working out the return. In applying the unit cost data for working out the cost of moving the additional anticipated traffic, normally the concept of 'long term variable cost' as a percentage of working expenses is adopted.

3.8.7.9 Taking into account all the points briefly high-lighted above, a project is considered
justified if it yields a return of 10 per cent or more, applying the D.C.F. technique.

3.8.7.10 The zonal Railway concerned carries out techno-economic feasibility survey by conducting field studies. This is in accordance with the precedent laid down in the Engineering Code. The Survey Report is sent to the Railway Board where it is examined by the Planning, Traffic (Transportation), Commercial, the Finance and the Economic Directorates from all possible angles.

3.8.7.11 So far, the Railways have been considering the remunerativeness of different projects on commercial considerations alone. The projects are not appraised on consideration of 'social profitability', though the National Transport Policy Committee has recommended that the Railway Projects should be appraised in a wider framework, using social benefit-cost criterion, but for such appraisals guidelines have yet to be laid down by the Planning Commission.