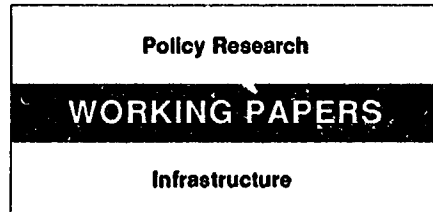


WPS 1006



Country Department I
Latin America and the Caribbean
The World Bank
October 1992
WPS 1006

Preparing Multiyear Railway Investment Plans

A Market-Oriented Approach

Jorge M. Rebelo

**Practical guidelines for developing a market-oriented multiyear
railway investment plan.**

Policy Research Working Papers disseminate the findings of work in progress and encourage the exchange of ideas among Bank staff and all others interested in development issues. These papers carry the names of the authors, reflect only their views, and should be used and cited accordingly. The findings, interpretations, and conclusions are the authors' own. They should not be attributed to the World Bank, its Board of Directors, its management, or any of its member countries.

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Infrastructure

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This paper — a product of the Infrastructure Division, Latin America and the Caribbean, Country Department I — is part of a larger effort in the region to provide practical guidelines which promote the commercial orientation of government-owned railway enterprises to make them financially self-sufficient. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Allison Turner, room I7-151, extension 30933 (October 1992, 74 pages).

With the emergence of a powerful trucking industry and the deregulation of transport, most of the once-powerful developing country railways are facing a struggle for survival. Traditional traffic is shifting to trucking and pipelines, governments are increasingly reluctant to write blank checks to cover deficits, and the falling morale of railroaders is harming productivity and reliability.

Railway managements know they must introduce institutional and organizational changes that make railways market-oriented. Governments must support legislation that creates an enabling environment that supports the railway's autonomy and allows it to compete.

Young planners and not-so-young railroaders struggling with multiyear investment plans tend to concentrate only on investing in infrastructure and acquiring equipment ("bricks and mortar"). They tend to ignore or underestimate essential institutional reform, without which the revival of the railways cannot be sustained.

Rebelo's practical and detailed paper will help railway planners prepare profit-oriented multiyear investment plans. He describes the steps of a plan and, within each step, lists basic issues and questions relevant to that step. He highlights the importance of marketing and sales

in the modern railway, and shows how to screen proposed projects and package them into meaningful corridors, where the level of service can benefit substantially from the proposed investment.

Long-term objectives for modernizing a railway, according to Rebelo, would include achieving complete autonomy from the government, supporting ongoing economic rehabilitation programs, maximizing profits, signing contract plans for government-imposed services, and developing railway real estate.

Medium-term objectives would include increasing the railway's commercial orientation, continuing the rehabilitation of plant and equipment, searching for and developing new markets, lobbying for approval of an enabling plan, and achieving an acceptable tonnage/staff ratio.

Short-term objectives would include supporting an ongoing economic rehabilitation program; maximizing profits; removing bottlenecks when an investment is not necessary to do so; starting the rehabilitation of plant and equipment; preparing a plan for developing an enabling environment; strengthening marketing and sales, accounting, and railway costing; and starting a manpower development and retraining program.

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**PREPARING MULTIYEAR RAILWAY
INVESTMENT PLANS:
A MARKET ORIENTED APPROACH**

by

JORGE M. REBELO

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PREFACE

1. With the emergence of a powerful trucking industry and the advent of transport deregulation, most of the once powerful developing country railways are facing a struggle for survival. Traditional traffic is shifting to trucking and pipelines, governments are increasingly reluctant to write blank checks to cover deficits, the falling morale of once proud railroaders is affecting in a very negative way overall productivity and reliability. Railway management knows that survival requires finding the proper role for the railway in the economy, exploiting its comparative advantages over other modes, tailoring its plant and equipment to its new needs, and challenging its competitors. But, above all, they also know that they must introduce institutional and organizational changes which will make the railway a market oriented enterprise which puts marketing and sales at the core of its actions and which shapes the other railway functions to serve the needs of the clients identified in the marketing plan.

2. Furthermore, management knows that without adequate traffic costing and a minimum of management information systems and telecommunications, real time troubleshooting and tailoring of services is hardly possible. Finally, governments are beginning to understand that if they want to see the railway's deficit reduced, they must support legislation to create the enabling environment which will enhance the railway's autonomy and allow it to compete on an equal footing with other modes.

3. One of the opportunities to embark on railway modernization plans arrives when a new multiyear investment plan is requested by Government and/or by bilateral or multilateral agencies which might be interested in financing the railway. A coherent investment plan using the corridor concept and calling for institutional and organization reforms within the railway and in the environment in which it operates, must be carefully prepared, evaluated and presented to both Government and financing agencies.

4. In most railways I have worked with, I saw young planners, and not so young railroaders, struggle with the preparation of these multiyear investment plans. More often than not, there was a tendency to concentrate only on infrastructure investment and equipment acquisition, while the fundamental institutional reforms mentioned above were either ignored or underestimated. The upshot was invariably a short-lived revival of the railways which could not be sustained because the plan was only "bricks and mortar" and lacked a durable institutional framework.

5. This paper is intended to help railway planners in the preparation of profit oriented multiyear investment plans. It describes the basic steps of a plan and within each, it lists a series of basic issues and questions which are relevant to that particular step of the planning process. The paper also attempts to highlight the importance of Marketing and Sales in the modern railway and to illustrate the screening of proposed projects and their packaging into meaningful corridors, where the level of service can benefit substantially from the proposed investment. It is my sincere hope that this paper will be useful to all

railroaders involved in the difficult task of preparing multiyear investment plans.

Jorge M. Rebelo

PREPARING MULTI-YEAR RAILWAY INVESTMENT PLANS:

A MARKET ORIENTED APPROACH:

BY: J.M. REBELO 1/

I. INTRODUCTION

1.01 One of the most challenging tasks faced by Railway managements around the world, is the preparation multi-year (usually five) Investment Plans designed to modernize their plant and equipment and to make their organizations more competitive and financially self-sufficient in the long run. To undertake the rehabilitation of the railways' physical plant and equipment, railway managers in developing countries are often faced with the thankless task of having to select only a very small number of projects from a lengthy list of proposals submitted by the various departments of the Railway. In addition, unlike their North American and European colleagues, they are seriously constrained by foreign exchange restrictions in their countries and by their lack of autonomy in a highly regulated institutional framework. Furthermore, their governments see their railways as employers of last resort and repeatedly ignore management requests to downsize their staff to more acceptable levels, because they fear the political and social impacts of such decisions. In short, the institutional, regulatory and financial obstacles faced by railway managers in developing countries are awesome and severely limit their autonomy and their ability to manage their enterprises from a commercial standpoint.

1.02 In general, the following problems are common to most developing railways, especially in Africa:

a. In the area of Infrastructure and Equipment.

- Track, in general, is in poor condition and substantial portions of it require renewal or some form of rehabilitation;
- Track maintenance equipment is run down or non-existent;
- Locomotives are poorly maintained either for lack of spare parts or inadequate maintenance practices. In addition, the locomotive fleet is composed by too many makes, making maintenance and acquisition of spare parts a difficult, if not impossible task;

1/ Sr. Transportation Planner of the Infrastructure Operations Division of the Brazil, Peru and Venezuela Department, Latin American and Caribbean Region of the World Bank. Prior to joining the Bank he was Director, Transportation Planning and Development of a wholly-owned subsidiary of Canadian Pacific Limited. He has worked both in an operating and railway consulting capacity in more than 25 countries.

- Freight cars are old, badly maintained and their braking systems need to be modernized;
- Communications are very primitive and prevent management from acting promptly throughout the system;
- Signalling, in and between stations on the network, is also unreliable and very often constrains capacity and safety.

b. In the Marketing and Sales area:

- Marketing railway services is an activity which is often not considered a priority and is, in general, confused with sales;
- Sales is an activity which consists in waiting for the client to come to the railway - rather than the opposite.
- Railway traffic costing is very aggregate and, therefore, of limited use, resulting in inadequate knowledge about the costs incurred by commodity and by type of service;
- Freight traffic is often "less than carload" (LCL) and container traffic is not encouraged.

c. In the Financial and Accounting area:

- the general accounting system is always late in producing financial statements. Moreover, the cost accounting system doesn't function and does not provide management with timely cost data for decision making or the costing department with basic inputs;
- The working capital (cash on hand) is very low and makes the use of revolving funds a constant necessity. This increases short-term debt to unacceptable levels;
- The long term debt is high, due to the successive devaluation of the national currency since most of the loans were incurred; debt service consumes most of the net income.

d. In the Operations and Maintenance area:

- Operations management is weak due to poor motive power and rolling stock management;
- Lack of real time communications and management information systems prevent immediate corrective actions in operations;
- Stores management is inefficient and most of the times produces bottlenecks in the maintenance schedules, increasing down times and affecting availability;

- The maintenance organization lacks discipline, motivation, and spare parts.
- e. In the Institutional area:
- The President of the Railway and the senior management change too often, preventing planning continuity and stability;
 - The railway is overstaffed by unskilled workers who cannot be easily fired or retrained;
 - Government does not pay the subsidies which it has agreed to pay when they are due, adding to the existing cash-flow problems;
 - Salaries are low compared to the private sector;
 - Branch line abandonment and station closure are often prevented by Government;
 - Tariff regulation does not allow a quick response to market needs and special contracts with major users;
 - There are no contract plans between Government and Railway to force each to explain deviations from pre-agreed commitments;
 - Furthermore, main rail lines are paralleled by national highways in which an aggressive, privately owned, flexible and politically powerful trucking industry operates new trucks, at axle loads above those allowed by law and with an overall level of service sometimes better than the railway can offer.

1.03 This picture is grim and may suggest that developing railways are financially unviable unless they modernize to exploit their comparative advantage over other modes, if any. The modernization of plant and equipment calls for well structured and cohesive investment plans, accompanied by organizational and institutional changes which ought to be carefully designed to increase the chances of a financially viable operation.

1.04 During the last three decades, multilateral and bilateral agencies have financed a great number of railway projects. According to the results of a controversial Bank report 2/ IDA loans to railways in developing countries have not always produced the desired financial self-

2/ "The Railways' Problem". Transportation, Water and Telecommunications Department, The World Bank, January 28, 1982

sufficiency they were aiming at. The problem seems to go far beyond technical improvements such as motive power or track rehabilitation which were often the most common targets for investment and which normally show short lived improvements after the rehabilitation. Indeed, at the core of the problem, there is a question of railway management attitude and/or government philosophy which must be urgently tackled if the railways are to modernize, play an effective economic role within the transport sector of their countries and have a chance of becoming financially viable.

1.05 Experience has shown that in very few cases have management of the railways and Governments sincerely attempted and succeeded in introducing organizational and institutional changes to accompany the physical infrastructure rehabilitation and equipment acquisition made possible by bi-lateral and multilateral loans. For example, governments are slow in allowing tariff deregulation, they do not give sufficient autonomy to railway management, they block indefinitely branch line abandonment, station closure and staff rationalization, they do not respect contracts-plans (yet they impose loss making services on the grounds that they are socially justified) and overall they are unwilling to work with the railways to find solutions for the overstaffing that plagues them. As a result, lending can produce short-term operational improvements due to the infrastructure rehabilitation and equipment acquisition but the financial viability of the railway is gradually undermined and, in five years or less, the lack of money for maintenance of track and equipment has an impact on its level of service and starts a new cycle of low reliability and high delays, which diverts traffic to other modes.

1.06 What made North American and some European railways so different from those in the developing countries? Faced with similar problems in the 1960's, North-American railways fought back. They specialized and trimmed their staff, they diversified into new areas, they changed their marketing and sales forces from a static group to an aggressive and dynamic organization which tailored the railways to the specific needs of their clients. Furthermore, they strengthened their costing and financial management, they introduced management information systems and telecommunications and poised themselves to compete with truckers by introducing intermodal services. However, both in the USA and Canada, the Federal Government cooperated with the railways to provide the required enabling environment through the introduction of appropriate legislation and by moving from total regulation to a policy of quasi deregulation and, in the 80's, to a stage of total deregulation. They agreed to branch line abandonment and to the absorption of passenger services and signed contracts to compensate the railways for services imposed by the State which had to be performed at tariffs below their long run variable costs. This marriage of efforts between Government and railways produced the organizational and institutional changes required to prop up the railways into an era of fierce competition between themselves and with other modes and allowed railway management to be commercially oriented.

1.07 The railway problems in Africa and in most of the developing world cannot be solved as easily. Even with the most competent managers, major rehabilitation is only financial self-sustainable if they operate in an "enabling environment", i.e., in a climate where they can effectively manage the railway with a commercial orientation without being choked by

institutional, regulatory and foreign exchange restrictions which handicap even the most able managers. But, if one continues to believe that infrastructure and equipment renewal oriented investment plans are the solution for a revival of the railways without a more comprehensive approach which proposes changes in the organization and institutional environment in which the railway operates, the results will continue to be as deceiving as they have been in the last 20 years. Without a solid commitment from Government ^{3/} which must be prepared, among other things, to allow staff cuts, line abandonment, cost based tariffs and management autonomy, it is illusory to expect that developing railways will give the quantum leap required to modernize and be financially self-sufficient.

1.08 Since the interaction between most railways and financial donors takes place when they prepare their 5-year investment plans, the latter are always an opportunity to provoke changes in the organizational, regulatory and institutional framework which surrounds the railway in order to create the enabling environment required for the restructuring of the railway. But, before doing that, the railway ought to be able to prepare a solid 5-year plan which is a blue print for change in all areas of the organization such as marketing management, railway costing, management information systems, financial management as well as in the traditional areas of investment. The railway must also define clearly the organizational and institutional changes required.

1.09 Faced with the huge list of problems described in paragraph 1.02, railway managers have two main preoccupations. One is to survive in the short-term by tackling individual problems that threaten to stop operations; the other is to modernize in the medium- and long-term to allow the railway to handle the traffic for which it is best suited. However, the list of problems is so long that managers often do not know where to start. Improvised actions or individual projects in the short-term are sometimes incompatible with medium and long-term plans. And then ... the crucial moment comes when a five year Investment Plan is needed in order to embark on a rehabilitation program and approach bilateral and multilateral organizations with a coherent list of projects which will enhance the financial viability of the Railway.

1.10 When the Railway's central planning office requests projects for inclusion in a five year Investment Plan, chances are that they will get a large number of projects from each of its departments, without priorities assigned to them. Frequently, projects will be submitted as individual actions and more often than not, the regional planning units, if they exist, will not submit packages of inter-related projects. Upper management receives a wide range of unrelated potential projects and decisions are made more or less subjectively. If the railway system is a network, what normally happens is that the five year Investment Plan results in a series of individual investments rarely concentrated in corridors and, therefore, the overall benefits of such investment are neither perceived by the users, i.e. by the market nor are they profitable

^{3/} See "Guidelines for Railway Restructuring" by Lee W. Huff, L.S. Thompson, IBRD, September 1989.

to the Railway. Indeed, these fragmented investment actions may even lead to decisions which are counter-productive because the problem has not been viewed as a whole.

1.11 In view of the above it may be useful to describe the planning concepts and tools which have been suggested and introduced in several Railways when faced with the problem of preparing a five year Investment Plan. The objectives of this paper are two-fold:

- a) To propose a clear procedure for the preparation of 5-year plans, with check lists to help in each step of the procedure.
- b) To emphasize organizational and institutional changes to be considered by the railway, in order to complement the modernization of its plant and services and act as a catalyst for change in management philosophy.

II. THE PLANNING PROCESS

2.01 The planning process followed in this paper consists in the following steps:

- Setting Objectives and Performance Targets
- Preparing a Marketing Plan
- Preparing a Transportation Plan
- Identifying and Defining Civil Works, Equipment, Technical Assistance and Institutional Projects
- Evaluating the Projects in the Investment Plan
- Determining the Financial Impact of the Plan

2.02 The reader might have noticed that there is nothing original in the proposed process since it follows the basic step by step approach used in most systems analysis. However, it is quite surprising that frequently, one or more of these essential steps are missing or are not clearly differentiated from the others in 5 year plans proposed by developing railways. For that reason, the output of those plans is often an unstructured and sometimes confusing picture of the proposed rehabilitation and, consequently, is not appealing to the Ministry of Planning and Finance and/or to the potential financing agencies.

2.03 Most North American and many European railways prepare their investment plans in considerable detail, using the opportunity to listen to the suggestions from their employees and customers, and tailoring them to available resources. They use different methods to put their plans together but, in general, they stress some interaction between the several levels of management in order to stimulate creativity and become aware of operational strategies and minor projects which the people who are closer to day to day operations consider crucial for a significant improvement of the level of service provided by the railway.

2.04 Canadian Pacific Railway created and marketed a method called Structured Planning, Evaluation and Control (SPEC) ^{4/} which is a group dynamics tool to map out the activities required to undertake complex projects. Using group sessions in specially outfitted rooms with magnetic boards and a moderator, the teams conduct brainstorming exercises listing issues and scheduling them and defining critical paths. The objective of the method is not only to encourage the interaction between specialists in different fields but also to create a responsibility, authority and communications matrix (RAC) which clearly defines the project scope and the responsibilities of the actors involved (see Annex 1 for an example). Other types of structured brainstorming are certainly useful and should be adapted to the cultural environment of the country which uses it. But as much as possible the planning process must be a mix of top down and bottom up proposals rather than an authoritarian top down approach.

^{4/} SPEC is an acronym for Structural Planning, Evaluation and Control and a registered trademark of Canadian Pacific Ltd., of which Canadian Pacific Railways is a member company.

2.05 To carry out the preparation of the 5 year plan it is suggested the creation of a Performance Improvement Task Force formed by one manager of each department and representatives of regional and head office management. Preferably, the group should be headed by someone specialized in financial management and with good knowledge of all major departments of the railway, in order to provide more credibility to the exercise. This group should spend a period of 1-2 months preparing the plan and then meet twice a year over a two- or three-week period to review the progress made towards the objectives set, to update the plan and to adjust the short, medium and long-term objectives for the organization accordingly.

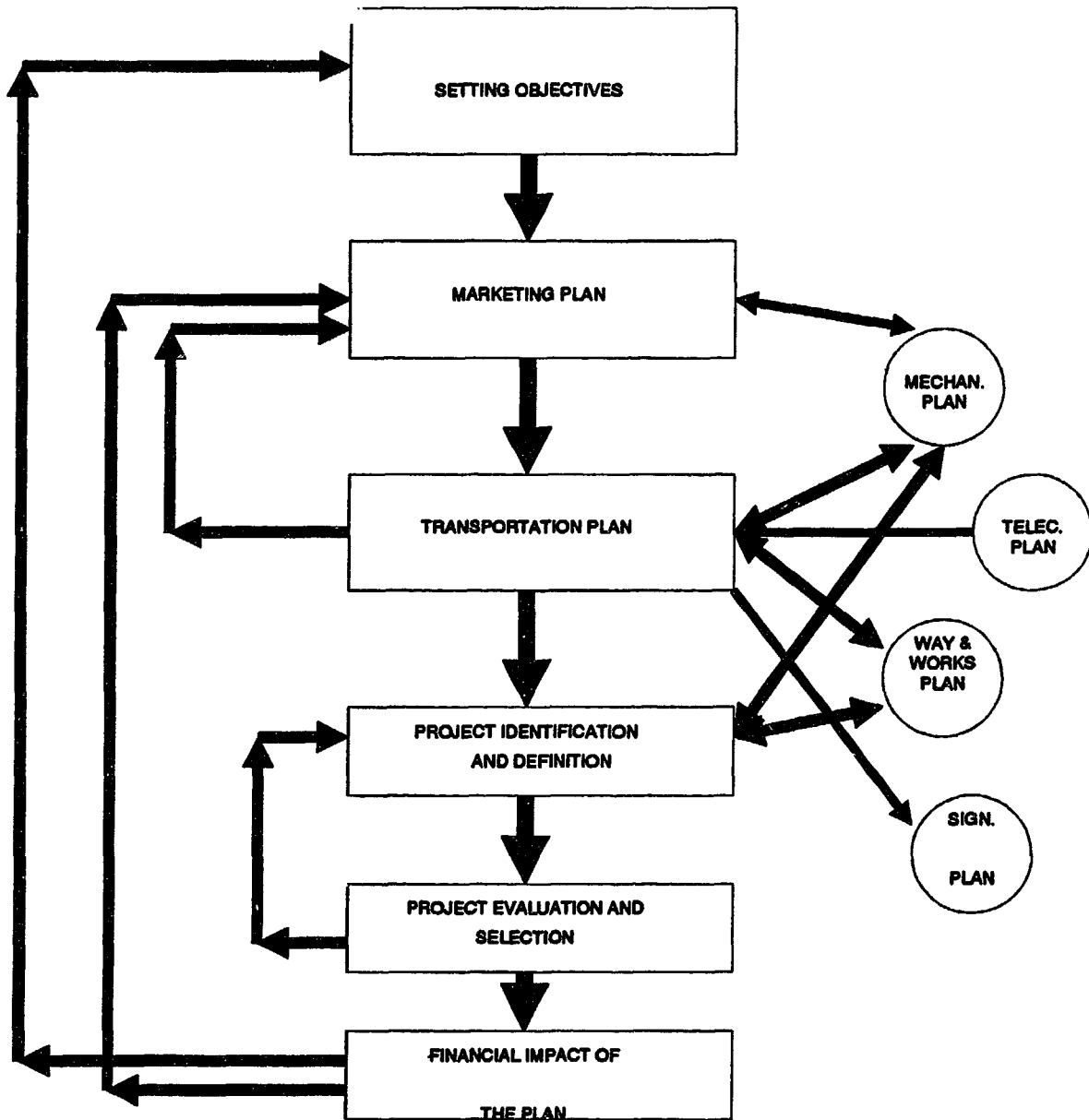


FIG. 1- THE PLANNING PROCESS

III. Setting Objectives

3.01 When preparing 5 year Investment Plans the first problem detected in several railways, is the state of total confusion regarding the objectives to be achieved. Sometimes, the objectives set by the Railway's upper management are too vague and cannot be easily defended when the ministry of Economy, Finance and Planning question their validity or even their priority over other transportation projects. Upper management must understand what are the Government macroeconomic objectives and what is the role of the railway in ongoing Economic Rehabilitation Plans. Once that role is understood, upper management must set its goals very clearly and explain them to middle management in special meetings where questions must be encouraged and concerns to translate the goals into performance targets discussed. Middle management (e.g., chief of each region) must translate upper management's objectives into performance targets so that these objectives are thoroughly understood at the division and subdivision level. Objectives may vary widely according to the specific railway corridor or region. It is our belief that upper management must, as a starting point, define the overall objectives for the Railway, for each region, for each line and for each corridor, if applicable. In addition, upper management must define short-medium and long term objectives in an unequivocal way. The advantage of a clear definition of objectives is that any projects proposed by lower management levels and whose objectives do not fit within the objectives defined by upper management, will be discarded. Box 1 is a sample of long, medium and short-term objectives for a railway. Box 2 describes the most common performance (operational and financial targets) used to translate short and medium-term objectives.

3.02 As mentioned above, before setting objectives for the railway rehabilitation, its senior management must try to understand very clearly the context in which the railway is inserted. In most developing countries the railways are government owned and must compete for scarce funds with other modes. The government will be pressured both internally and externally to select the most economic investments from the standpoint of the country as whole. Therefore, the railway management ought to start by understanding what are the government macroeconomic objectives, what is the economic role of the railway and more specifically what is the economic role of the railway in the ongoing programs for Economic Rehabilitation. It is suggested that, with the help of its planning team, the railway senior management finds convincing answers to the following questions:

- Why are we investing x million \$U.S. in this rehabilitation?
- What is it that the railway can offer at a lower economic cost than other modes?
- If we undertake the project what can be expected in terms of reduction of subsidies from the Government budget and when will they occur?

LONG TERM OBJECTIVES

- Achieve Complete Autonomy from Government
- Support Ongoing Economic Rehabilitation Programs-
- Profit Maximization
- Sign Contract Plans for Government Imposed Services
- Develop Railway Real Estate

MEDIUM TERM OBJECTIVES

- Increase Commercial Orientation of Railway
- Continue Rehabilitation of Plant and Equipment
- Search and Develop New Markets
- Lobby for Approval of Enabling Plan
- Achieve Acceptable Tonnage/Staff Ratio

SHORT TERM OBJECTIVES

- Support Ongoing Economic Rehabilitation Program
- Maximize Profit
- Remove Existing Bottlenecks which do not
Require Investment
- Start Rehabilitation of Plant and Equipment
- Prepare an Enabling Environment Plan
- Strengthen Marketing & Sales, Accounting &
Railway Costing
- Start Manpower Development/Retraining Program

- When do you expect the railway to be financially self-sufficient?
- What do you want from Government other than the financial contribution or credit guarantees? What are the regulatory and institutional changes expected?
- What happens if the money for the rehabilitation is not made available (do nothing) ? How much will it cost the Government to operate the railway in this case?
- What are the consequences of shutting down the railway?
- How do you expect to repay the loans required?

Some of these questions might look unfair given that a lot of the problems faced by the railway might be the result of bad economic management on the part of the Government. However, they will be asked if not by Government probably by the officers of financial institutions and very solid answers will be more convincing than emotional and angry reactions. It is important to make a solid case for the rehabilitation objectives.

3.03 Government officials will be particularly interested in learning about the comparative advantages of the railway, its long term financial self-sustainability and the consequences of doing nothing. Thinking through these questions ahead of time will provide senior management with a clearer definition of the short, medium and long term objectives of the railway and will allow them to sharpen the focus of the rehabilitation.

3.04 One of the main obstacles in defining clear objectives is that management tends to be biased towards its railways and, after all, keeping its job and making it bigger. That is only human. However, too biased an analysis may be counterproductive because National Planning Agencies tend, in general, to be pro-highway and will be more easily convinced with solid economic arguments which point to sizeable national economic savings rather than emotional arguments based on the traditional role of the railways and its historic importance to the country. In short, arguments must be from an economic and financial standpoint solid and wherever possible quantified in terms which highlight their importance, such as the reduction in the government subsidy, the savings in the cost/ton of strategic commodity exports/imports, etc.

3.05 Having gone through this "soul searching" exercise, senior management will be in a position to list a first version of its short, medium and long term objectives. At this point, it should start an interactive process with middle management to obtain their feedback in how realistic are the proposed objectives and whether they can be translated into performance targets. One way of doing this is to hold special meetings where questions will be encouraged and concerns voiced. In some countries there might be cultural barriers which prevent this type of open criticism. In those cases it is senior management's responsibility to find the best way to obtain a genuine feed-back from middle management and to encourage dialogue between middle and senior managers.

BOX 2 - EXAMPLE OF PERFORMANCE TARGETS

Operational Performance Targets	1987	1988	1989	1990	1991	1992
1. Freight Traffic (billion net ton-km)	8.0	8.8	9.8	10.1	10.4	10.7
2. Locomotive Availability (%)	70	73	76	78	79	80
3. Locomotive Utilization (%)	67	69	70	72	73	74
4. Loco. Productivity (million gross ton-km)	64	68	76	84	86	88
5. Freight Car Availability (%)	91	91	92	92	93	93
6. Freight Car Turnaround Time (days)	9.0	8.3	7.5	6.8	6.7	6.7
7. Average Wagon Loan (net tons)	45	45	45	46	46	46
8. Maximum Number of Staff (in '000)	20.0	20.0	20.0	19.7	19.5	19.2

Financial Performance Targets	1987	1988	1989	1990	1991	1992	1993
1. Working Ratio 1/	.93	.94	.77	.75	.73	.71	.69
2. Freight Business Working Ratio 1/	.93	.84	.75	.70	.67	.64	.61
3. Long-Distance Passenger Working Ratio 1/	1.6	1.5	1.4	1.3	1.2	1.1	1.0
4. Metropolitan Train Working Ratio 1/	1.4	1.0	1.0	1.0	1.0	1.0	1.0
5. Maximum Normalization (% Op. Revenue) 2/	12	12	10	8	7	5	3
6. Maximum Borrowings (% Int. Gen. Funds) 3/	3404/3404/		80	45	40	40	40
7. Collection of Accounts Receivables (Days)	60	60	60	60	60	60	60

- 1/ Including normalization payments within the stipulated limits.
- 2/ Normalization payments for long-distance passenger and freight services only, as a percentage of the corresponding total operating revenues, including payments for the long-distance passenger services to reduce to no more than 25% of long-distance passenger operating revenues in 1993.
- 3/ Excluding Bank loan and funds borrowed from the Federal Government for servicing federally guaranteed debt.
- 4/ Based on the 1987-1988 combined results.

IV. Marketing Plan

4.01 In internal audits of railway projects, the Bank has often found that traffic forecasts, especially those pertaining to freight traffic, are very optimistic and do not materialize within the project horizon. The lower traffic levels lead to lower revenues and often, projects which were considered financially viable at appraisal, become real losers. Traffic forecasts are a very crucial input to any rehabilitation plan and, therefore, deserve a lot of attention. Quite often, traffic forecasts are inflated to justify the project and no "worst" case scenarios are tested. Proper assessment of traffic requires an elaborate plan which not only forecasts traffic but also proposes strategies to capture it and indicates the level of the revenues which the traffic is expected to generate. This step of the planning process is called the Marketing Plan.

4.02 In most developing Railways, a Marketing Plan either exists in a very general form (and is not good for anything) or it does not exist at all. Why is it so often neglected? One reason may be that contrary to North American practice, most railways in developing countries are state-owned and very little importance is given to the Marketing Departments. MARKETING is one of the main functions where institutional change is required in most developing country railways. Some of these railways are still functioning under the "monopoly syndrome" and no attempt is made to attract shippers to use its services. The North American mentality is that "marketing is the heart of the railway" and all that can be done to attract the shippers, divert them from other modes, and serve their specific needs must be done. This philosophy has been successful and was basically responsible for a "comeback" by the railways at a time when it was losing traffic to the highway.

4.03 Marketing Plans are only useful if they contain detailed passenger and freight demand analyses for each corridor or link under study. Passenger traffic must be analyzed carefully and sound knowledge of elasticities of traffic with respect to tariffs and other level of service attributes must be shown. For freight, the analysis should be done on a commodity basis by corridor and, again, elasticities of traffic with respect to tariff, reliability, etc. must be analyzed. However, this cannot be only a theoretical modelling exercise in which the human factor is underestimated. On the contrary, detailed traffic forecasts require continuous interaction with present and potential clients in order to determine their industrial strategies, their distribution needs, their packaging requirements, their alternative options to ship the products, their F.O.B. cost at the port of exit and their upper limits for the transportation cost in order to be competitive in the world markets. It also requires knowledge about storage methods, reliability, loss and damage. All this information will allow the design of strategies to capture the traffic at a cost which is lower than the competition. We stress the importance of a Marketing Plan because the whole planning process hinges on traffic forecasts and the marketing strategy proposed to capture that traffic.

- **MARKETING** is defined as the identification of markets and the design of the transportation services, including the price, required to serve the market at the maximum profit attainable.

- **SALES** is viewed as the activity of persuading the customer to use and to increase the use of transportation.

- **Responsibilities of the Marketing and Sales Department:**
 - Market analysis and the identification of opportunities
 - Pricing
 - Equipment and service design
 - Industrial development
 - Distribution system designs
 - Promotion
 - Sales

FIG.2 - WHAT IS MARKETING AND SALES ?

4.04 Marketing is also the catalyst for the development of new types of operations and services and was largely responsible for the introduction of services such as "Intermodal". A Marketing Plan needs to address questions such as the following:

- How should the Marketing Department be organized, by region or by group of products?
- What makes the marketing of one product a priority over another product (profitability vs. national economic factors)?
- Should marketing strategies be corridor or network-oriented?
- How should customers be reached? (through freight forwarders, directly to customer service centers, etc.?)
- Should LCL 5/ traffic be abandoned?
- Should TOFC/COFC 6/ services be started in any corridor? How can these services be appraised?

4.05 The Marketing Plan must contain a clear explanation of the marketing strategy assumed to achieve the traffic forecast: Higher frequency? Lower tariff? Faster turnaround time? Higher reliability? Annex 2.1 describes in detail the main aspects of a Marketing Plan for Passengers and Freight and Annex 2.2 the issues to consider when planning intermodal services.

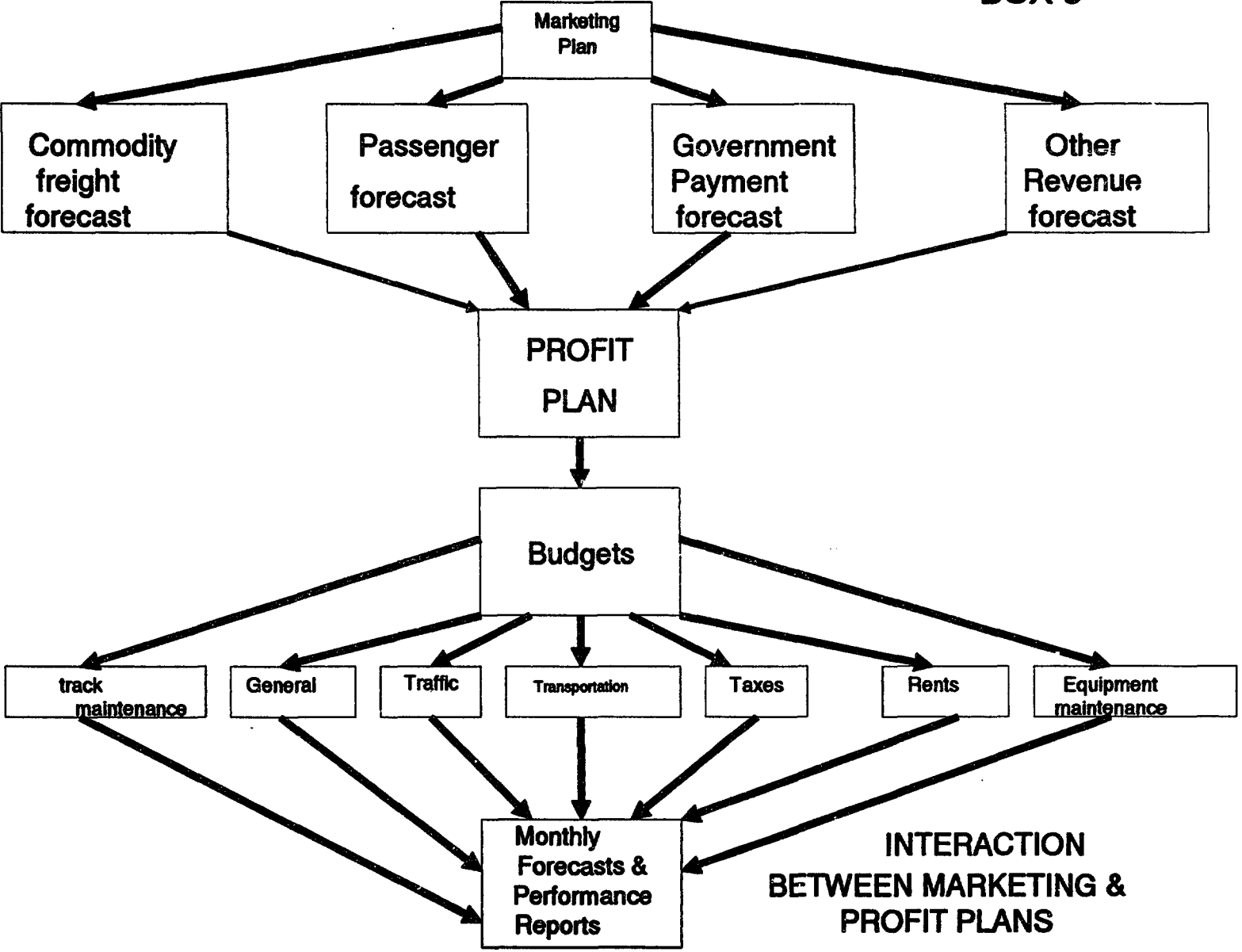
4.06 Inaccurate forecasts will result in inaccurate investment evaluations because traffic forecasts are one of the main inputs for the revenue cost projections. Box 3 shows how the revenue projections, the profit plan and annual budgets interface and reiterates the importance of a well prepared marketing plan. One cannot overemphasize the importance of a Marketing Plan since it is the basic document where the strategies which the railway plans to use to satisfy its present and potential clients are described. A good marketing plan requires an intimate knowledge of the several industries and businesses served by the railway and must be based on a reasonable forecast of the economic trends in the country and its neighbors. It must also be a document which is easy to read and follow by the sales force.

4.07 Box 4 shows the information flow freight forecast for a North American railway. It is the responsibility of the Marketing and Sales Department to identify the equipment (specialized cars and facilities) to satisfy the needs of each major client and to propose the type of service required to meet the level of service requirements expected by the client. This information is passed on and discussed with the Transportation Department.

5/ LCL - Less than Carload.

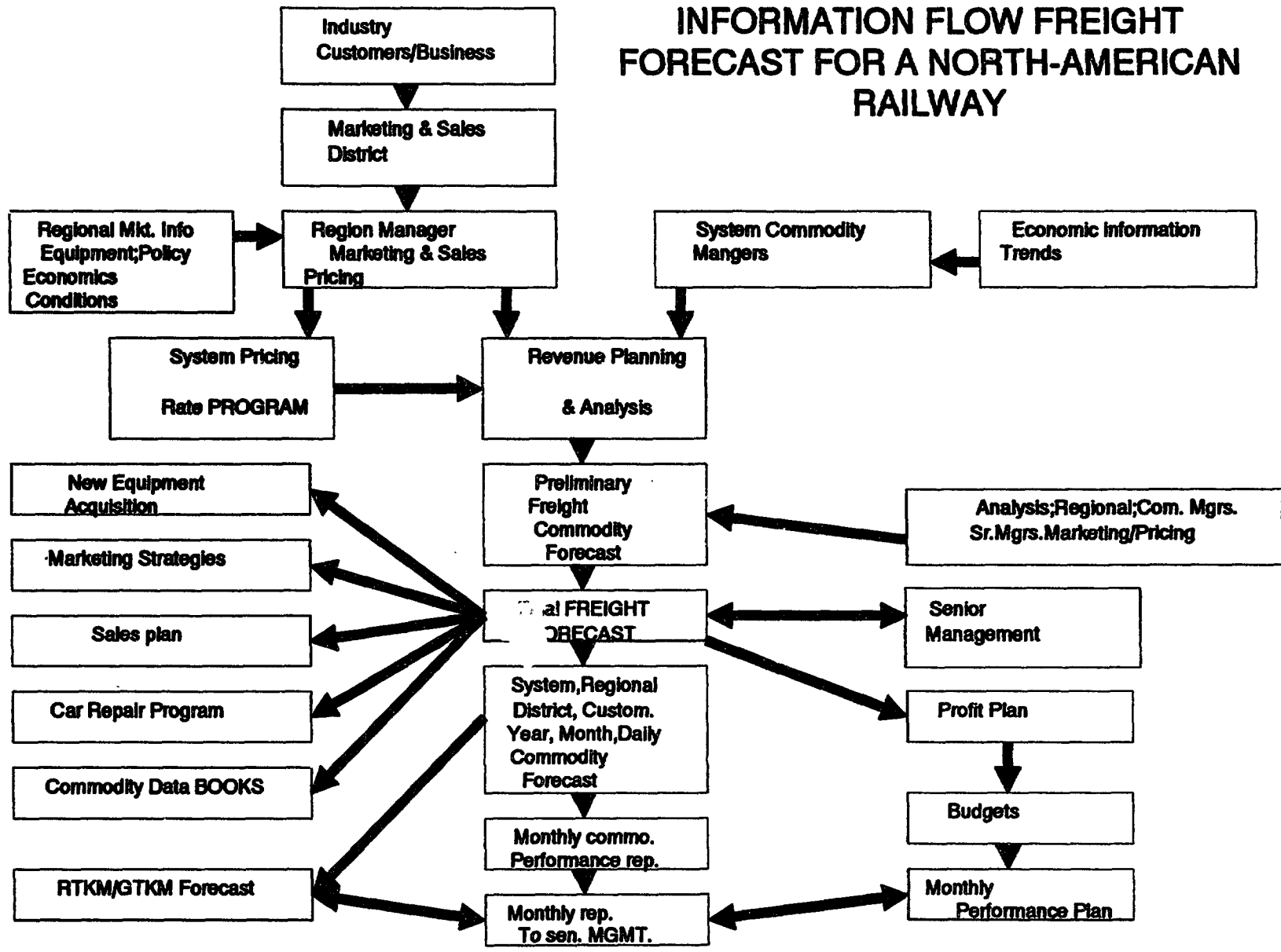
6/ TOFC - Trailer on Flat Car. Container on Flat Car.

BOX 3



BOX 4

INFORMATION FLOW FREIGHT FORECAST FOR A NORTH-AMERICAN RAILWAY



V. The Transportation Plan

5.01 Once the Marketing Plan defines the customers and services to be provided, the next step is to produce a Transportation Plan, i.e., a plan which indicates how the railway is going to move the commodities identified in the Marketing Plan to/from the shippers. It is the primary responsibility of the Transportation Department to devise the operating strategies required to move the commodities at the lowest cost to the company and which provide the level of service which the customer has been promised by the Marketing and Sales Department. This shows how interrelated become the marketing and sales and the transportation functions and also suggests that several iterations are necessary before both arrive at a consensus. Before proposing any operating strategies, the Transportation Department must identify the basic restrictions (length of sidings, speed restrictions, grade rulings, axle load limitations on bridges and links of the system, track maintenance windows). It must also review the present bottlenecks such as long delays in yards due to poor switching, lack of motive power, car unavailability by type due to long turnaround times, poor telecommunications, etc and make reasonable assumptions about the evolution of those aspects. This evidently requires continuous interaction with the Way and Works and Mechanical Departments.

5.02 After having examined in detail the improvements which it can achieve in its 3 basic functions, namely, locomotive management, car management and yard management, the Transportation Department will be in a position to propose the operating strategies required to move the commodities. For example: Short vs. long trains, unit trains, intermodal trains, mixed trains, trains of empties, scheduled vs. unscheduled trains, etc. On the basis of these proposed strategies, the transportation department will be able to indicate the base locomotive and car fleets required in the next few years. This information is then sent to the Mechanical Department which will examine whether it can provide those fleets or if there is a need to acquire extra motive power and cars. At the same time the Transportation Department will inform the Way and Works Department about its assumptions concerning speeds, axle loads and grades and discuss if they can be achieved or if they should be adjusted otherwise. In most cases, to satisfy the goals of the marketing plan, it will be necessary to undertake civil works and equipment acquisition and, therefore, a preliminary list of proposed projects to be included in the rehabilitation plan will emerge from this exercise.

5.03 At the same time, the Transportation Department must focus on the projects required to improve locomotive and car management, and yard operations. Car management philosophy must always take into account:

- Freight cars are valuable system assets.
- Freight car turnaround times must be improved and monitored.
- Freight car inventory must be kept at the level of base demand.

- Freight cars must be maintained to system standards.
- Non company equipment, i.e., equipment from other railways should be used to maximum advantage.
- Profitability is a consideration in car distribution strategy.
- New equipment is acquired on a strict economic basis.

5.04 The car management process takes into account the following functional components:

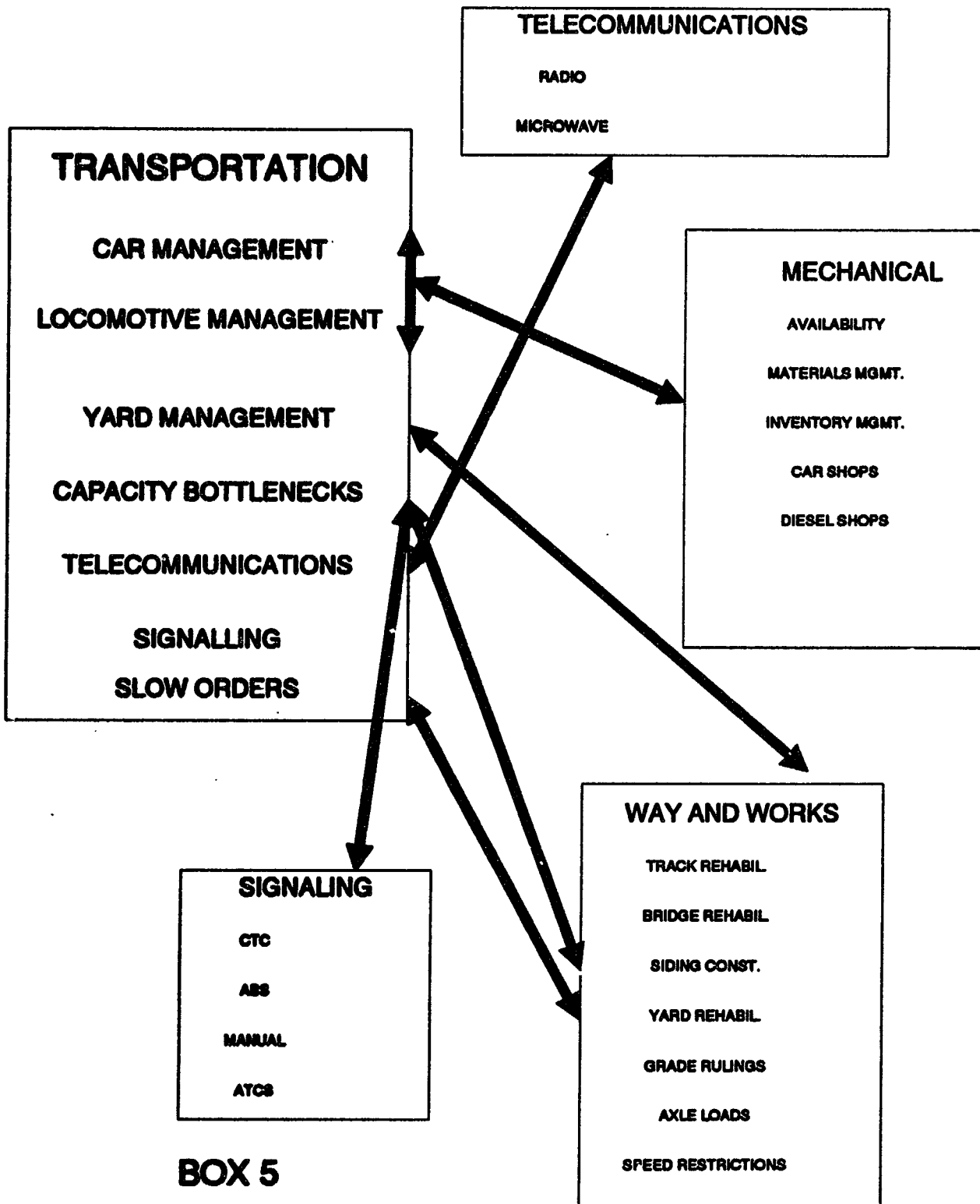
- Ordering of equipment.
- Forecasting car demand and supply.
- Planning car distribution.
- Supplying of equipment.
- Monitoring car distribution
- Monitoring demand for equipment.
- Post auditing car demand and supply.

The planning team must remember that additional cars , as required to meet demands, ought to be justified on the basis of profitability and only when it can be proved that the railway is getting the maximum utilization from the existing fleet, utilized at its maximum. To help in the car management process the railways must examine if the introduction of management information systems is justified and maybe suggest the inclusion of such project in the rehabilitation plan.

5.05 The locomotive management ^{7/} philosophy to be used is also a major aspect of the plan. The main points to be examined are:

- Locomotive control and distribution: Who assigns the locomotives? Should they be assigned centrally? Are locomotives deployed according to plan ? Are they assigned according to availability and train specification? Are there any displays showing the location, type and status of each locomotive at any moment? Are there reliable 24 hour real time communications with all points of the system? How is the interface with the Mechanical Department? Can it be improved? Is there knowledge of anticipated demand with time to react? How are priorities established at peaks?
- Locomotive utilization: How is it measured? Can it be improved? Is there a control system? Are maintenance standards satisfactory? Do territorial productivity standards vary considerably and why?

^{7/} For a good discussion of the locomotive availability and utilization concept see Budin, K. 'Managing locomotive availability and utilization', Transport note, March 1990, INUTD, IBRD.



INTERACTION BETWEEN TRANSPORTATION AND OTHER DEPARTMENTS

- Locomotive planning: How is the distribution plan monitored (daily) ? In times of shortage can leasing be easily arranged? Are their reciprocal exchanges with other systems? How is the fleet sizing and design undertaken ?

From this type of exercise will emerge a consensus about the areas of locomotive management which need improvement and the type of projects which must be undertaken to achieve those improvements.

5.06 Yard Planning is one of the most important components of the Transportation Plan. Bad yard management and planning has led, in the past, to long delays in yards which increase considerably the car turnaround times. Inadequate permanent inventory , control and location techniques make car tracking very difficult in yards and adds to the unreliability of the systems. Lack of advanced train consist information is another reason for delays which are unacceptable. Finally, poor switching practices and often lack of adequate switching power may aggravate the delays in the yard. Yard planning is therefore an important aspect of the transportation plan, because minor changes such as the introduction of a management information systems module and basic telecommunications, might produce substantial productivity gains in car and locomotive utilization. Addition of additional switching tracks and even, wherever adequately justified, construction of new yards are some of the few projects which might be evaluated by the planning team.

5.07 The Mechanical Department, once it receives the overall car and locomotive requirements from the Transportation and Marketing and Sales, must check its inventory and decide on the basis of the existing availability and utilization rates whether there will be enough cars. If not, the first thing to check is whether the availability rates can be substantially improved and which are the operating practices and capital improvements required:

- Is this a problem of availability of spare parts? How can it be improved?
- Is there effective inventory management?
- Are running shops providing the expected level of service? What about the major car repair facilities? Are they properly equipped? Is labor productivity a major problem?
- Are diesel shops properly equipped and managed? Is there a need for skilled personnel?
- Are there too many makes of locomotives and consequently a need for major standardization?
- Are there too many unforeseen immobilization of locomotives due to accidents, etc.?

- Are there many locomotives and cars which should have been scrapped but which are still in the active list and, consequently, make availability rates look worse?

After answering this type of questions, the Mechanical Department should propose its fleet acquisition plans and be able to defend it in meetings with the Transportation, Marketing and Sales and Planning Department. A cost efficient Mechanical Department must try to defer capital acquisitions and work very hard on viable equipment rehabilitation, improvement of availability rates and efficiency of its workshops.

5.08 The Way and Works Department, after having received the plans from Transportation, should verify all the speed restrictions, grade rulings, axle load limitations, especially in bridges, and prepare a plan for track rehabilitation and heavy maintenance. Plans for building new sidings, branch lines, improve or rehabilitate bridges must be ranked by order of priority and costs. Major plans to extend the line on building major capital improvements must be properly documented and justified. Maintenance philosophy and policies (degree of mechanization, standards) should be explained and maintenance windows indicated.

5.09 Several iterative cycles will be required between the Marketing, Transportation, Mechanical and Way and Works departments until a fine-tuned plan emerges for each of the scenarios assumed by Marketing. At this point and as a result of the several interactions there will be a preliminary list of projects required which will be labelled high, medium and low priority.

5.10 At this stage, all the regions and districts must receive a copy of the Railway Objectives and the Marketing and Transportation Plans and they must start defining individual projects which must be undertaken to allow efficient operations as proposed in the Transportation Plan. Projects will have to satisfy the requirements established in those three documents and be ranked by some multi-criteria method before submission to Central Planning Group.

VI. Project Identification/Definition

6.01 The next step is the Project Identification and Definition Plan. Using the projects submitted by each region, the Performance Improvement Task Force should try to put the inter-related projects in packages which are relevant for the railway as a whole and for each corridor identified in the Marketing Plan. There will be broadly 4 categories of projects which must be taken into account: i) Civil Works . ii) Equipment Acquisition. iii) Institutional and Organization studies. iv) Technical Assistance. They are discussed below.

6.02 The Civil Works project are normally those identified by the Way and Works and Mechanical Departments. They involve track rehabilitation, bridge rehabilitation, lengthening of sidings, improvement in yards, rehabilitation and/or construction of mechanical workshops, etc. They are normally easy to identify and very costly to execute and account for most of the money available. Caution must be exercised in order to propose only what is required for the substantial improvement of operations and relegate to subsequent phases major extensions which are costly and will only produce benefits in the long term.

6.03 The Equipment acquisition projects consist in the actual definition of the cars and locomotives to be bought. They also include other equipment such as telecommunications and signalling, intermodal equipment, track maintenance equipment, mechanical shops equipment, spare parts, etc. Equipment acquisition requires very careful planning to guarantee a certain standardization which later will facilitate maintenance. Equipment normally accounts for the other important share of the investment plan.

6.04 The Organization and Institutional Studies are normally accepted by most railways seeking money because they know that bi-lateral and multilateral agencies would not make them loans if they don't accept them. This is clearly the wrong attitude towards probably the most significant changes which can be introduced in the railways. These studies and the implementation of their recommendations should form the core of the blue print for modernization which most developing railways are actually seeking in order to become commercially oriented and self-sufficient in the long run. Some of the questions which will lead to these studies are:

- What are the basic regulatory and institutional constraints which prevent us from working as any other commercial enterprise?
- What is the "enabling environment" which we would like the government to create so that we can be less dependent on government?
- Should we propose a contract-plan to government and insist in guarantees that social imposed services be timely and adequately compensated?

BOX 6

TYPICAL PROJECTS IN A REHABILITATION PLAN

CIVIL WORKS PROJECTS

TRACK REHABILITATION
TRACK RENEWAL
BRIDGE REHABILITATION
YARD CONSTRUCTION/REHABILITATION
WORKSHOP CONSTRUCTION/REHABILITATION

EQUIPMENT

CAR ACQUISITION
CAR REHABILITATION
LOCOMOTIVE ACQUISITION/REHABILITATION

SPARE PARTS
WORKSHOP TOOLS
SIGNALLING EQUIPMENT
TRACK MAINTENANCE EQUIPMENT

TELECOMMUNICATIONS EQUIPMENT
COMPUTER EQUIPMENT
VEHICLES

ORGANIZATION AND INSTITUTION

ORGANIZATION STUDY
ENABLING ENVIRONMENT STUDY

MANPOWER DEVELOPMENT/RATIONALIZATION STUDY
RAILWAY COSTING AND TARIFFS STUDY
MANAGEMENT INFORMATION SYSTEM STUDY
PRIVATE DEVELOPMENT STUDY

TECHNICAL ASSISTANCE

OPERATIONS
MARKETING

FINANCIAL MANAGEMENT
TRACK MAINTENANCE
EQUIPMENT MAINTENANCE
STUDIES AND PLANNING

- What type of organization structure should we have to achieve the goals set by management?
- What type of staff structure is most appropriate? What are the needs in terms of staff rationalization, retraining, recycling? How can we entice staff to quit and yet provide adequate compensation?
- What are the impediments to abandon branch lines where the railway has no comparative advantage?
- Is our costing system g/ providing disaggregate information which allows us to assess adequately the profitability of each commodity ? What can be done to improve costing?
- Is our accounting system providing accurate and on time information for financial management purposes?
- Is our planning and statistics department providing the accurate information required for day to day management?
- Should we commission a study to investigate where management information systems 2/ can help in improving productivity and propose a M.I.S. plan?
- Are there any other ways of tapping revenue such as selling or leasing railway land, sell idle workshop time, etc.?
- Can any of the present activities of the railway be subcontracted to the private sector? Should joint ventures be undertaken and why ?

g/ For a good discussion of railway costing see 'Railway Costing: A Review' Canadian Transport Commission, Rep. 3 1986/02E.

The Bank has financed the preparation of a Lotus based spreadsheet to compute long run marginal costs in developing railways using default values where the basic information is not used. The name of this program is 'OSCAR' and is presently being tested in African Railways

2/ For a good discussion of Management Information Systems, see D. Porter "Modular Management Information Systems for Railways", IBRD, 1988.

FIG. 3 - RAILWAY COSTING : A CRUCIAL TOOL IN THE MODERN RAILWAY

- Railway costing is one of the most vital management tools in the modern railway organization
- The estimation of long-run marginal costs, by commodity and for different types of service, is a full time activity, which employs inputs from cost accounting, engineering, operations and statistics. Therefore, it requires a good accounting system and reliable operating statistics.
- The separation of costs into fixed and variable costs and the estimation of unit costs, demands appropriate techniques which vary from railway to railway and cannot be easily generalized.
- The long-run marginal costs are the floor for the setting of appropriate tariffs. Only an accurate knowledge of these unit costs will allow you the inputs required to cost different types of movements and services and the flexibility to negotiate contracts above the minimum floor.
- Knowledge of avoidable costs, i.e., costs which can be avoided if the service is discontinued (e.g., passenger trains, branch line abandonment and station closure), are essential to discuss subsidies for services imposed by government
- Knowledge of joint costs are crucial to cost services (e.g., passenger/freight) which share the same facilities.

Many other questions can and should be asked in a very open minded way in order to raise issues which are particular to each country and which must be addressed at this time.

6.05 Planners should make an effort to identify the potential contradictions, duplications or even deviations from the objectives which were agreed at the outset. A second problem frequently noted is that proponents of some projects are not able to answer the following question:

- What will be the consequences of not undertaking or delaying implementation of the project proposed?

This very fundamental question should be posed to every proponent of a project and will certainly show whether he really thought about the need for the project. The forms shown in Figures 4,5, 6 and 7 were successfully used in the process of project definition. The form, when properly completed, is a system analysis of the project definition and allows the planning department to screen very quickly projects which were not properly identified.

6.06 The result of this process should be a list of projects by corridor, link or region grouped in packages with a priority assigned by their proponents on the basis of a multi-criteria method, but without economic and/or financial analysis. 10/

10/It would be ideal to have a multi-criteria analysis, including economic and financial rates of return. However, it would be unrealistic to expect that all the regions or districts would have the personnel to do such calculations.

FIGURE 4
EXAMPLE OF A MULTI-CRITERIA METHOD FOR PRIORITY ASSIGNMENT

Parameters ⁽¹⁾	Projects Points										
	Weights ⁽²⁾	Project ⁽³⁾	Points	Project	Points	Project	Points	Project	Points	Project	Points
1. Amount of investment											
2. Maintenance cost											
3. Homogeneity of subsystem (speed, axle load)											
4. Minimum speed											
5. Continuity											
6. Present traffic density											
7. Potential freight traffic											
8. Potential passenger traffic											
9. Benefits for isolated areas											
10. Relations with neighbour countries											
11. Economic activity of country											
12. Connection to ports											

- (1) These parameters are selected by Central Planning Office (CPO)
- (2) The weights are set by a task force representing the CPO, users, and government
- (3) A value between 0 and 10 (0 = worst, 10 = best) is assigned by proponents of projects
- (4) This column is equal to the weight times the points

**FIGURE 5
DESCRIPTION OF PROPOSED PROJECT
(PROJECT IDENTIFICATION)**

(1) Code:	(2) Date:	
(3) Department/Line/Gerencia/Vice-President	(4) Prepared by:	(16) Classification
	(5) Approved by:	
(6) Project	(13) Benefits	
(7) Objectives		
(8) Expected results		
(9) Consequences if project is eliminated	(12) Costs Type Year	
	Investment Materials Manpower	
	Total	
	Operating Maintenance	
(10) Alternatives to obtain desired results	(11) Advantages	(14) Disadvantages
(15) Notes		

**FIGURE 6
PROJECT DEFINITION**

CODE

Objectives:
Measures of efficiency:
Generation of alternatives: (Describe the alternatives considered) Alt. 1 Alt. 2 Alt. 3 Alt. 4 Alt. 5
Evaluation of alternatives:
Selection of alternatives:
Notes:

FIGURE 7
PROJECT DEFINITION

CODE

Objectives:

Increase capacity of a single line in order to handle "x" trains/peak hour in each direction at the lowest cost and highest safety.

Measures of efficiency:

- number of trains/peak hour
- minutes of delay/type of system
- investment cost
- number of station agents
- maintenance costs/year
- number of accidents/year

Generation of alternatives: (Describe the alternatives considered)

- Alt. 1 - Automatic Block System (ABS)
- Alt. 2 - Centralized Traffic Control
- Alt. 3 - Sidings and ABS
- Alt. 4 - Double Track
- Alt. 5 - Manual Block (status quo)

Evaluation of alternatives:

	Capacity (trains/h)	Delay (minutes)	Number of Agents (No.)	Number of Accidents (No.)	Investment Cost (\$)	Maintenance Cost (TL/year)
Alt. 1						
Alt. 2						
Alt. 3						
Alt. 4						
Alt. 5						

Selection of alternatives:

e.g. Alternatives (1) and (2) are the preferred from a technical standpoint. They must be submitted to financial analysis.

Notes:

The financial analysis will complete the evaluation of alternatives.

VII. Project Evaluation

7.01 The next step is the Project Evaluation Plan. This step, which is to be performed by both the railway central planning organization and planners in each region (if any), consists in the economic and financial evaluation of the projects in the plan. Using well-known discounted cash flow techniques, the planners must try to determine the Net Present Values or Internal Rates of Return for both the project and the corridor where the project is located. This step is also considered of great importance both by international lending agencies and the Transport and Planning Ministries which must decide between investments for several modes and sectors.

EVALUATING INVESTMENT PROPOSALS

7.02 Financial and Economic Evaluation techniques based on discounted cash flows, either by the Net Present Value or Internal Rate of Return methods, are widely known. We will not address these techniques because that is not the main issue in this step of the evaluation project. The main issue is: To which projects should those techniques be applied?

7.03 Should we prepare the plan on the basis of individual projects, e.g., rehabilitation of 100 km of track or acquisition of 100 locomotives? Or should we evaluate them as packages attributable to a specific corridor? If we have limited capital, generally the rule rather than the exception, should we assign the money to the individual projects with the highest rate of return, irrespective of their location in the network? Or should we group the projects in packages, determine the overall rate of return for each corridor; establish the most economic and/or financially profitable corridors and then assign the money to the projects with the highest rates of return within the chosen corridors? These questions are crucial in selecting projects for a five-year Investment Plan. Let us examine the issues involved.

7.04 If we determined the rates of return for individual projects, we might get a scattered distribution of investment throughout the network: some locomotives in Line A, a few track renewals in Lines B and C, signalling in Line D. If this scattered pattern of investment is followed, the result is no clearly perceived improvement in the level of service offered by the Railway. In addition, each of those individual projects is evaluated on the basis of assumptions related to the completion of other projects in the line or region where that project is located. For example, track renewal in Line B assumed that new four-axle freight cars to replace the old two-axle cars will be used in Line B. The second project may not materialize (maybe it was the track project). Therefore, some of the benefits attributed to the track renewal project will never materialize.

7.05 Instead, if the corridor concept is used, the situation is different. The projects in each corridor are put together in packages. The package for the corridor, that is, a set of integrated projects which will provide a certain level of service quality targeted by the decision-makers, will be evaluated against the corridor without projects and compared to all the other corridors identified in the network. The most promising corridors will be slated for investment and inter-related

projects will be programmed in such a way that they will be implemented in the shortest possible time, making their benefits to the users visible at the earliest possible time. The perceived improvement of the level of service offered by the Railway will be noticed by shippers and will attract traffic.

7.06 The corridor concept does not mean that the project will have to be located in a straight line. The term corridor may be replaced by hinterland in the case of a group of branch lines which lead to a port (or other terminal). The idea behind the corridor concept is a group of lines, branch lines or segments of a line whose main purpose is to attain certain primary objectives such as the transportation of grain, or the high speed transportation of passengers or the flow of exports and imports from/to a landlocked country. In the next section, we examine in more detail the corridor concept and how evaluation techniques can be applied to them.

APPLYING THE CORRIDOR CONCEPT

7.07 To determine the rate of return for a corridor, the following steps must be taken:

- a) Identify all the relevant projects in the corridor.
- b) Select the projects which are inter-related, i.e., those which are in the critical path and without which the others cannot be.
- c) Map out a cash flow schedule (benefits and costs for each project) assuming that other inter-related projects in the corridor will be undertaken.
- d) Ensure that there is no double counting of costs and benefits
- e) Apply the discounted cash flow techniques to the package of projects by comparing the corridor with and without the projects.

One of the main concerns in application of the concept should be to avoid double-counting of costs and benefits and considerable experience and attention is required to avoid this very common pitfall. The analyst should devote a great deal of attention to this aspect.

7.08 In summary, the Investment Plan, as defined in previous sections, consists of many sub-projects, organized by corridors, most of which have been submitted to an economic and financial evaluation. Most of the sub-projects in a corridor are inter-related. For example, the benefits from rehabilitation of permanent way depend on the forecast level of traffic, which depends in part on the availability of motive power and rolling stock, which in turn is affected by other sub-projects which affect operating efficiency, including rehabilitation of permanent way, thus completing the causal circle. The individual projects in each corridor, therefore, constitute an integrated investment program.

7.09 However, in order to evaluate the contribution that each individual project would make to the corridor, it is necessary to isolate the effects from each sub-project. To do this, when evaluating the individual sub-projects it is assumed that "the without project case"

represents only the exclusion of the sub-project in question and that the other integrated sub-projects in the corridor would be implemented according to the Plan. Thus, the resulting rate of return on each sub-project represents the economic contribution of that sub-project when all the sub-projects in the corridor to which it is related are undertaken. Alternatively stated, the realization of the rate of return on any one of the sub-projects is dependent upon the implementation of several other sub-projects in the corridor. The importance of implementing the investments as a package or an integrated program is clearly seen from these relationships.

7.10 The above-mentioned approach is fairly easy when the projects are track renewals or improvements, signaling projects or any other projects related to fixed installations. The approach becomes more problematic when the projects are related to locomotives and rolling stock. In different corridors, one has to artificially assign a fleet of locomotives and rolling stock to the corridor. In the case of passenger coaches, it is not as difficult because they are in general dedicated to a particular corridor. Despite these difficulties, the package approach is the most realistic way to examine the rate of return for all investment projects proposed for a corridor.

VIII. Financial Impact of the Plan

8.01 Finally, the planners must determine the Financial Impact of the proposed Investment Plan on the balance sheet, income statement and sources and applications of funds of the Railway and obtain the ratios which describe the financial health of the firm, with and without the Investment Plan. The Financial Plan, under several scenarios, will allow the calculation of the break even volumes of traffic required for different tariff schedules and, at the same time, will provide more information about the sources and applications of funds necessary to undertake the plan. Several iterations might be required to re-schedule the investments in a way which will not strain the Railway's finances beyond what is considered reasonable by Government and lending institutions. Annex 3 which was developed in the context of a Bank financed Railway Project in which the author participated, exemplifies how to assess the financial impact of an Investment Plan.

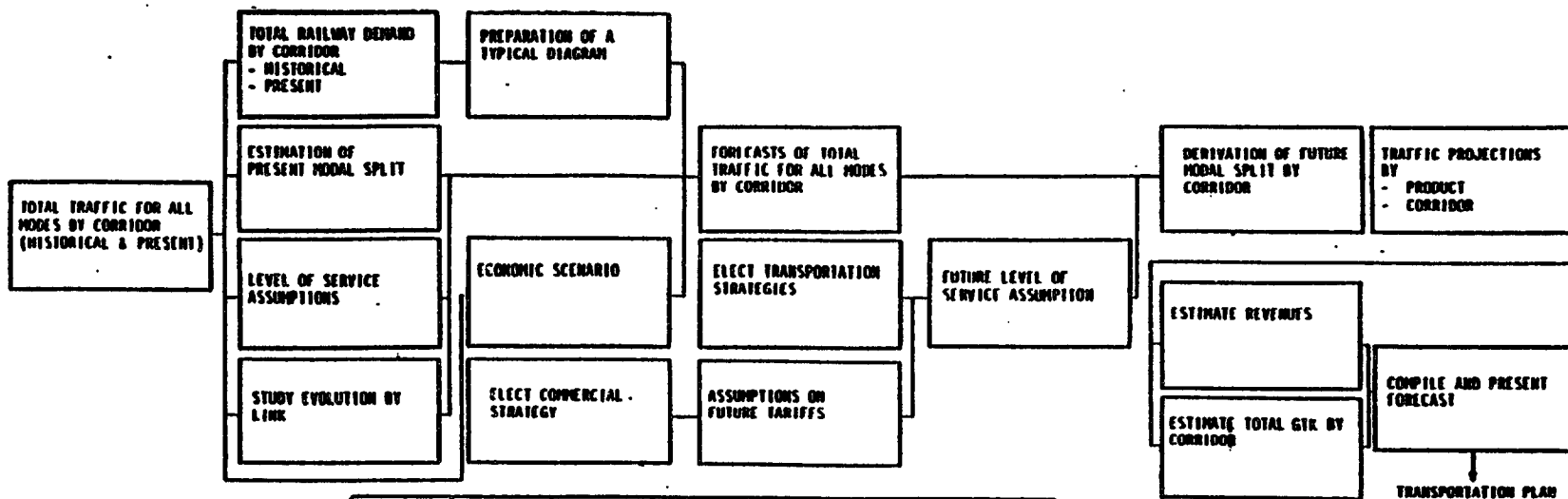
8.02 While undertaking the financial impact of the plan, the planners should study very carefully the present financial ratios and propose ways to improve them. For example, are accounts receivable too high? Can the average collection period be reduced? Are there clients which systematically take too long to pay their bills? Are Government bills being paid and to what extent do they affect working capital if they are not paid? Is the total bill for fuel and materials reasonable? What proportion of annual expenses goes to staff salaries and benefits? What can be done to reduce short term debt service? What is the actual break even point of the railway before and after the plan? Is it achievable? What sort of across the board tariff increases or traffic increases or both are necessary to reach the break even point? Where else can we cut expenses? All these questions must be asked and the financial impact of a plan must be an opportunity to rethink financial management and send a message throughout the railway about where to cut expenses and increase revenues.

8.03 Particular attention must be paid to the preparation of the sources and applications of funds. From this statement the railway management will have a good idea of the external financing required and will be able to prepare a financing plan for presentation to government and bilateral and multilateral agencies.

ANNEX 1

An Illustration of A Planning Process

DEVELOPING THE MARKETING PLAN



	TOTAL DEMAND		PRESENT MODAL SPLIT		PRESENT LEVEL OF SERVICE EVOLUTION BY LINK		TYPICAL DIAGRAM		ECONOMIC SCENARIO		TOTAL TRAFFIC FORECAST		FUTURE TARIFFS		FUTURE LEVEL OF SERVICE		TRAFFIC PROJECTIONS BY PRODUCT AND CORRIDOR		ESTIMATE REVENUES		GTR BY CORRIDOR		COMPILE AND PRESENT		
MINISTRY OF TRANSPORT PRES. & VICE-PRES.																									
HEAD OFFICE TRANSPORTATION																									
MARKETING & SALES																									
LINE FINANCIAL																									
PLANNING INVESTMENT PLANNING GROUP																									
OPERATIONS MECHANICAL & WAY & WORKS EVALUATION GROUP MANAGEMENT CONTROL																									
ECONOMICS MARKETING & SALES																									
STATISTICS COSTS																									

Responsibility

Authority

Communication

R1

Prime performance,
Held accountable for
the execution of the
complete task.
For each task there
must be one, and only
one, R1.

A1

Must approve,
executive. The final
approval represents
the authority to
assign resources
(money, people, etc.)
to the project.

C1

Must be consulted,
informally, before
the fact.

R2

Limited execution.
Held fully
accountable for the
execution of part of
the task.

A2

Must approve,
professional. Must
approve for reasons
related to a
professional
responsibility such
as technical, legal,
medical, financial,
environmental, labour
relations, etc.

C2

Must be informed
informally. May be
affected by the task.

R3

Coordination.
Responsible for
coordination of all
the work within the
task.
Powers to enforce or
execute coordination
must be defined.
Usually implies a
person assigned to
coordinate on a full
or near full-time
basis.
If no R3 is assigned,
then the coordination
function goes with
the R1.

A3

Must recommend for
approval, usually to
the A1 or another A3.

Implies A2.

C3

Must advise or guide,
formally before the
fact.

C4

Must be formally
informed, advised or
instructed. Is
affected by the task.

Note: In general, all the R& A imply some or all the C.

ANNEX 2

**MARKETING PLANS FOR FREIGHT AND
PASSENGER:
PROPOSED TABLES OF CONTENT**

MARKETING PLAN

1. **MARKETING** is one of the functions where institutional change is required in most developing country railways. Some of these railways are still functioning under the "monopoly syndrome" and no attempt is made to attract shippers to use their services. The North American mentality is that "marketing is the heart of the railway" and all that can be done to attract the shippers, divert them from other modes, and serve their specific needs must be done. This philosophy has been successful and was basically responsible for a "comeback" by the railway at a time when it was losing traffic to the highway.

Marketing is also the catalyst for the development of new types of operations and services and was largely responsible for the introduction of services such as "Intermodal".

A Marketing Plan needs to address questions such as the following:

- How should the Marketing Department be organized, by region or by group of products?
- What makes the marketing of one product a priority over another product (profitability vs. national economic factors)
- Should marketing strategies be corridor or network-oriented?
- How should customers be reached? (through freight forwarders, directly to customer service centers, etc.?)
- Should LCL 11/ traffic be abandoned?
- Should TOFC/COFC 12/ services be started in any corridor?
How can these services be appraised?

The objective of this Annex is to provide table of contents for the preparation of a marketing plan for individual commodities and for passengers. The Marketing Plans must be written in a very clear and concise way, so that a person who does not know anything about the "product" may understand easily the actions which the Railway should follow to improve its position in the market for the product. In the next sections we propose table of contents for the marketing plan for a commodity and for passenger services.

11/ LCL - Less than Carload.

12/ TOFC - Trailer on Flat Car. Container on Flat Car.

2. TABLE OF CONTENTS FOR A MARKETING PLAN FOR A PRODUCT

The items to be included in a Marketing Plan for a product are:

2.1 Description of the present market for the product and background

- a) Total production of the product in the last 10 years;
Originating areas and % of their participation in total production;
Consumption areas and % of their participation in total consumption;
- b) Main routes used to distribute the product from origin to destination;
- c) Detailed description of the modal split for distribution of the product in the last five years;
 - Percentage transported by the Railway in each of the submarkets identified for the product;
 - Comparison of the quality of service attributes (tariff, travel time, reliability, etc.) for each mode in each submarket;
 - If possible, preparation of origin-destination matrices for the Railway and other modes for the base year.

2.2 Description of the Railway's strategies to maintain and increase its share of the market

- a) Definition of scenarios (pessimistic, realistic and optimistic) for the forecast time horizon, description of the assumptions on the main economic indicators which may influence the production and transportation of the product (Sector GNP, cost of fuel, export targets, etc.) and level of service offered by the Railway;
- b) Description of the commercial strategies to be used to capture and maintain the traffic and the level of service assumed in the strategies (speed, availability of cars, reliability, door-to-door service, loss and damage, tariffs);
This aspect must be described carefully indicating the strategy for each submarket and each line/corridor. The tariff plan for the study horizon must be very clear.

2.3 Traffic forecast for the duration of the plan

- a) Indication of the total production estimated for the years of the plan (based on information from the producers, by historical trend analyses or by economic models)
- b) Indication of whether distribution patterns are expected to change; that is, whether the production and consumption zones remain the same;
- c) Estimation of the new modal split based on the scenarios and strategies proposed, using econometric models or subjective judgment with justification;
- d) Estimation of the traffic forecast for the product, by origin-destination (O/D), for each scenario;
- e) Preparation of a typical load diagram for the product, for each line.

2.4 Estimation of revenue

Based on the tariff plan, estimation of the revenues expected from the traffic forecast.

3. TABLE OF CONTENTS FOR A MARKETING PLAN FOR PASSENGER TRAFFIC

The marketing plan for passenger traffic should contain the following items:

- 3.1 Description of the present passenger market and background**
 - a) Total trip generation in the last 10 years (global and O/D matrix);
 - b) Classification of trips by purpose (that is, % of business, % for pleasure, etc.);
 - c) Main routes used to undertake the trips;
 - d) Modal split for each present O/D and, if possible, evolution of the modal split in the last five years;
 - e) Comparison of the attributes of level of service (tariff, travel time, reliability, comfort, etc.) for each mode;
 - f) Trends during the last five years of the following socio-economic data for the main origins and destinations:
 - Total population and travelling population
 - Average income per capita
 - Number of autos per capita
 - Hotel capacity
 - Average cost of living index
 - Fuel cost
- 3.2 Description of the Railway's strategies to maintain and increase its share of the present passenger market**
 - a) Definition of scenarios (pessimistic, realistic and optimistic) for the forecast time horizon, describing the assumptions on the basic socio-economic and demographic indicators which may influence the total generation of trips and their level of service;
 - b) Description of the commercial strategies to capture and/or maintain a certain traffic and the level of service quality assumed in those strategies (speed, comfort, complementary services, tariff, auto train, reservation services, etc.). These assumptions must be explained very carefully, indicating the strategy for each submarket and line/corridor. The tariff plan for the Railway and the assumptions on the competition must also be described in a very clear way.
- 3.3 Traffic forecasts for the plan's horizon**
 - a) Indication of the total trip generation for each year of the plan based on assumptions or economic models (generation model);
 - b) Indication of whether the spatial distribution of trips remains the same, that is, if the O/D's remain the same;
 - c) Indication of the new modal split based on the scenarios and proposed strategies (based on economic models or subjective judgment, justified with surveys, analysis, etc.);
 - d) Assignment of flows to each route;
 - e) Estimation of the new traffic projects for each year, for each scenario by %;
 - f) Preparation of typical passenger load diagrams for each line/corridor
- 3.4 Estimation of the revenues: Based on the Tariff Plan, estimation of the income which corresponds to the traffic forecast.**

INTERMODAL SERVICES

If intermodal services are being considered, the following is a check list of issues to be considered. The user of these guidelines should examine all the issues listed below to determine if an intermodal service should be proposed. 13/

I. ADVANTAGES OF RAIL-TRUCK INTERMODAL OPERATION TO RAILWAY, TRUCKER AND SHIPPER:

1.1 Railway

Can serve a broader market;

Reduces capital costs in:

- equipment
- terminals
- intra-city switching;

Reduces operating costs, particularly fuel

1.2 Trucker

Reduces costs of moving from city to city;

Reduces capital requirements.

1.3 Shipper

Better door-to-door service time, particularly for long haul;

More reliable service than highway;

Costs savings to railway and trucker means lower tariff;

Less loss and damage.

2. MARKETS

Markets are affected by:

- Terminal location
- Service offered
- Tariff structure and cost of operations
- Relative abilities to move freight by highway and rail

3. TERMINALS

Design, location and number of terminals are affected by:

- Land availability
- Proximity to existing railway, road and highway network
- Kind of equipment chosen
- Volume of traffic, present and future
- Service requirements
- Stuffing-destuffing requirements

4. ROAD SYSTEM

- Nature of road network (condition of roads, permissible axle loads)
- Ownership of trucks, tractors, trailers (individual operator, trucking companies)
- Rate Structure
- Cost Structure
- Licensing Restrictions
- Accidents

5. RAILROAD SYSTEM

13/ Based on a presentation entitled 'Intermodal - An alternative for Revitalization of Railways' by R.A. Shea and Jorge Rebelo in Ferrocarriles Argentinos, Buenos Aires, March 1983.

- Condition of Existing Rail Network
 - Allowable axle weight
 - Allowable and actual speeds
 - Number and size of trains
 - Derailments and other accidents
 - Marshalling facilities
 - Clearance restrictions on right-of-way
- Door-to-Door Service Times
- Type and Number of Locomotives and Wagons that Presently Exist
- Cost Structure of Railway and its Ability to Change
- Type of Equipment for Intermodal Operation

6. ORGANIZATION

Organizations should be designed for particular situations and should address the following needs:

- Marketing and Sales
 - Market development
 - Market analysis
 - Sales
 - New terminal and equipment evaluation
- Tariffs
- Costing
- Operations

7. INFORMATION

- Inventory of Boxes, Trailers, Tractors
 - Where they are located, in or outside of the terminals
 - Status, whether empty, loaded
 - Accounting Information
 - Billings
 - Collection
 - Expenditures
- Maintenance Information to Ensure Adequate Maintenance and Inventories of Spare Parts
- Management Report
 - Performance standards
 - Utilization
 - Costs and revenues
 - Other as required

8. FINANCIAL ANALYSIS

- Capital Investment Required
- Operating Costs
- Savings in Costs
- Impact on Cash Flow
- Return on Investment
- Impact on Other Sectors:
 - Trucker
 - Industry

Road network

- **Impact on Workers**
- **Impact on Financial Statements**

9. PROPOSED APPROACH FOR A STUDY TO INTRODUCE INTERMODAL SERVICES

Because intermodal is a system, its viability is best examined in traffic corridors. The approach to be followed is:

- **Select a number of corridors for examination;**
- **Carry out a preliminary examination of each corridor;**
- **From preliminary examination, select one corridor for detailed examination.**

9.1 Selection of Corridor

Viable Corridors contain a number of centers that have traffic which is suitable for trailers or containers:

Manufactured goods

Farm products

Traffic presently moving in trucks

Traffic presently moving by rail but requiring trans-shipment to trucks.

Transit time between centers by road and rail can be made comparable and the road network is congested.

ANNEX 3
FINANCIAL EVALUATION OF
INVESTMENT PLANS

CASE A - THE NORTHERN FREIGHT RAILROAD (N.F.R.)

N.F.R. is a small railroad operating from city A to city B. A new cement factory is being built near the line, whose production will be sent to both cities. The cement company will pay for the short spur line to connect the factory to N.F.R.'s main line, and it will also purchase the railway freight cars needed to carry both bulk and bagged cement. N.F.R. has sufficient track and yard capacity, but would have to invest in more locomotives, in order to haul the additional trains required to carry the forecast cement traffic.

N.F.R., on the basis of this traffic forecast and on its estimates of the cost of hauling the traffic (locomotive cost, maintenance of equipment and track terminal costs, etc.) has negotiated rates with the cement company which will result in an adequate financial return being earned on this traffic. N.F.R.'s evaluation of the project to purchase locomotives indicates a satisfactory IRR, and an adequate future cashflow from the project. For this exercise price inflation is ignored.

N.F.R.'s summarized profit and loss account, cashflow and balance sheet for the current year are given below:

**EXISTING FINANCIAL PERFORMANCE AND STATUS - NORTHERN FREIGHT RAILROAD
SUMMARY PROFIT AND LOSS ACCOUNT**

Year ended December 31st, 1980 (in \$ 000)

REVENUES		EXPENSES	
Freight operating revenues	950	Working Expenses (labor, fuel, materials, general)	750
Miscellaneous	50	Depreciation	<u>100</u>
Total Operating Revenues	1,000	Total Operating Expenses	850
Net Operating Revenue	150	Loan Interest	50
	<u>150</u>	Net Income	<u>100</u>

CASH FLOW

SOURCES OF FUNDS		USES OF FUNDS	
Net Operating Revenue		Debt Service:	
Revenue	150	Loan Interest	50
Depreciation	100	Repayment	60
		Increase in Working Capital	<u>75</u>
		Total uses of Funds	185
		Net Cash Increase	<u>65</u>
Total Funds Available	250	Total Funds Used	250

BALANCE SHEET

LIABILITIES		ASSETS	
Current Liabilities	180	Current Assets:	
Long term debt	500	Cash	75
Capital:		Other	125
Equity	1,400	Sub-Total	200
Accumulated Surplus	<u>120</u>	Fixed Assets:	
		Locomotives	500
		Others	<u>2,000</u>
		Sub-Total	2,500
		Less accumulated depreciation	<u>500</u>
		Net Fixed Assets	<u>2,000</u>
Total Capital Liabilities	<u>2,200</u>	Total Assets	<u>2,200</u>

During the forthcoming year N.F.R. assumes that:

- a) traffic, operating revenues and expenses will be substantially the same as in 1980;
- b) the purchase of additional locomotives, similar to those already in use and which are comparatively new, will be completed, and
- c) construction of the cement factory, and of the connecting spur line, will also be completed.

N.F.R.'s project evaluation assumes the following:

Cost of additional locomotives	\$ (000)	150
Borrowing needed	"	100
Terms of borrowing:		
Interest 10 % p.a.		
Repayment 10 years commencing 1982		
Additional annual revenues (1982 onwards)	"	250
Additional annual working expenses (1982 onwards)	"	205
Additional annual depreciation (1982 onwards)	"	15
Additional net operating revenues (1982 onwards)	"	30

The effect of these changes would be shown on N.F.R.'s forecast financial statements as follows:

FORECAST FINANCIAL PERFORMANCE AND STATUS (\$ 000)
SUMMARY OF PROFIT AND LOSS ACCOUNTS 1980-1982

	1981 (ACTUAL)	1982 (BUDGET) ADJUSTMENT	TOTAL	1983 (FORECAST) ADJUSTMENT	TOTAL
Freight Operating Revenues	950	--	950	250	1,200
Miscellaneous Revenues	50	--	50	--	50
	-----	-----	-----	-----	-----
Total Operating Revenues	1,000	--	1,000	250	1,250
	-----	-----	-----	-----	-----
Net Operating Revenue	150	--	150	30	180
	-----	-----	-----	-----	-----
Loan Interest	50	--	50	10	680
	-----	-----	-----	-----	-----
<u>Net Income</u>	100	--	100	20	120
	-----	-----	-----	-----	-----

SUMMARY OF CASHFLOWS 1980-1982

	1981 (ACTUAL)	1982 (BUDGET) ADJUSTMENT*	TOTAL	1983 (FORECAST) ADJUSTMENT	TOTAL
SOURCES OF FUNDS					
Net Operating Revenue	150	--	150	30	180
Depreciation	100	--	100	15	115
Borrowing	--	100	100	(100)	--
Total Funds Available	250	100	350	(55)	295
Uses of Funds					
Debt Service - Loan Interest	50	--	50	10	60
- Loan Repayment	60	--	60	--	60
Increase (Decrease)					
Working Capital	75	--	75	(15)	60
Capital Investment - Locos	--	150	100	(150)	--
Total Uses of Funds	185	150	335	(155)	180
Net Cash Increase (Decrease)	65	(50)	15	100	115
Loan Interest	50	--	50	10	680
Net Income	100	--	100	20	120

* "Adjust" represents movements due to Project

SUMMARY BALANCE SHEET 1980-82 (000)

	1981 (ACTUAL)	1982 (BUDGET) ADJUSTMENT	TOTAL	1983 (FORECAST) ADJUSTMENT	TOTAL
LIABILITIES					
Current Liabilities	180	25	205	15	220
Long-Term Debt	500	(60)	540	(60)	480
		100			
Capital - Equity	1,400	--	1,400	--	1,400
- Accumulated Surplus	120	100	220	120	340
Sub-Total Capital	1,520	100	1,620	120	1,740
Total Capital + Liabilities	2,200	165	2,365	75	2,440
Assets					
Current Assets - Cash	75	15	90	115	60
- Other	125	100	225	75	300
Sub-Total - Current Assets	200	115	315	190	505
Fixed Assets - Locomotives	500	150	650	--	650
- Other	2,000	--	2,000	--	2,000
Sub-Total - Gross Fixed Assets	2,500	150	2,650	--	2,650
Less Accumulated Depreciation	(500)	(100)	(600)	(115)	(715)
Net Fixed Assets	2,000	50	2,050	(115)	1,935
Total Assets	2,200	165	2,365	75	2,440

CASE B 14/ - THE XYZ RAILWAY

This is a small, purely freight line operating ten locomotives and 200 freight cars, and currently carries 700,000 tons of freight annually. Traffic is expected to rise by about 500,000 tons over the next two or three years provided XYZ can acquire new traction and freight cars, improve equipment maintenance and improve some sections of track.

XYZ's investment plan is as follows:

- a) Scrap five old locomotives, and purchase eight new, more powerful units;
- b) Scrap 50 old freight cars (of 50 tons capacity) and purchase 160 new cars, each of 60 tons capacity;
- c) Improve track by replacing rails, fastenings and sleepers on certain sections, and improving ballast;
- d) Improving equipment maintenance workshops.

The justifications for each investment category are:

- a) Replacing five old locomotives with eight new, more power units will:
 - i) enable the railway to haul the additional expected traffic; thus earning additional revenues;
 - ii) save on locomotive maintenance cost per traffic unit;
 - iii) save on operating costs per traffic unit.
- b) Replacing 50 old freight cars with 160 new, higher capacity cars will:
 - i) carry additional traffic and earn higher revenues;
 - ii) save on car maintenance costs per traffic unit.
- c) Improving track will:
 - i) assist in carrying the additional traffic;
 - ii) reduce track maintenance costs per traffic unit.
- d) Improving workshops: new equipment needed to handle increased work load of expanded locomotive and car fleet.

14/ This case study was prepared by consultants in a Bank financed project in Argentina from 1982-84, to illustrate financial evaluation of investment plans.

The investment is expected to be financed by about 72% by long-term debt (repayment over 8 years, after one years grace, at 10% interest rate), plus 28% as short-term financing, from the government, repayable in year 3. Expenditure is expected to spread over two years; thus the first year of full operation would be year three of the plan.

XYZ's current Balance sheet is summarized in Exhibit 8 and the current fiscal year is shown in Exhibit C.

EXHIBIT A
MEDIUM TERM INVESTMENT PLAN FOR THE RAILWAY
(Thousand U.S. \$)

PROJECTS	YEARS			TOTAL
	1	2	-	
Way & Works	2,180	2,180	-	4,360
Signalling and Communications	240	250	-	490
Motive Power	4,850	4,850	-	9,700
Rolling stock	5,820	5,820	-	11,640
Miscellaneous	100	90	-	190
	<hr/>	<hr/>	<hr/>	<hr/>
Total	13,190	13,190	-	26,380
Physical Contingencies	410	410	-	820
	<hr/>	<hr/>	<hr/>	<hr/>
Sub-Total Program	13,600	13,600	-	27,200
Price Contingencies	--	--	-	-
	<hr/>	<hr/>	<hr/>	<hr/>

EXHIBIT B
BALANCE SHEET AT THE END OF LAST FISCAL YEAR

LIABILITIES	\$	000	ASSETS	\$	000
Current Liabilities		3,000	Current Assets:		5,000
Long-term Debt (*)		20,000	Fixed Assets:		
Capital:		10,000	Locomotives (10)		10,000
Accrued Surplus		2,000	Freight cars (200)		10,000
			Track & Stations		15,000
			Workshops		2,000
			Others		3,000
			Gross Fixed Assets		40,000
			Less: Accumulated depreciation		10,000
			Net Fixed Assets		<u>30,000</u>
Total Liabilities		<u>35,000</u>	Total Assets		<u>35,000</u>

(*) Repayable over 8 years, at 10% annual interest

**EXHIBIT C
PROFIT AND LOSS ACCOUNT**

(Current Year)

REVENUES	\$ 000	EXPENSES	\$ 000
Freight Revenues	15,000	Track Maintenance	3,250
Miscellaneous	1,000	Locomotive Maintenance	1,040
		Freight Car Maintenance	1,560
		Train Operations	1,560
		Stations & Yards	2,340
		Administration & General	1,300
		Sub-Total	<u>11,050</u>
		Depreciation	1,950
Total Revenues	<u>16,000</u>	Total Operating Costs	<u>13,000</u>
		Net Operating Revenue	<u>3,000</u>
		Loan Interest	<u>2,000</u>
		Net Revenue	<u>1,000</u>

For the sake of convenience, investment expenditure is assumed to be equal in each of years one and two, i.e., \$13,600.000 each year, financed by \$8 million debt each year plus short-term financing of \$5 million in year one. It is also assumed that four new locomotives and eighty new freight cars would be purchased in the first year, with the remainder during the second year. Traffic in year one would be at the same level as at present, increasing by 250,000 tons in year two, and by a further 250,000 tons in year three.

The assumptions and calculations regarding operating revenues, costs and savings, are as follows:

Investments Plan

A railway investment plan usually consists in:

- a) Scrappage of a group of "m" obsolete locomotives and purchase of "n" new, more powerful units;
- b) Scrappage of a group of "p" old wagons and purchase of "q" new units with greater capacity;
- c) Improvement of "x" track kilometers, replacing rails, junctures and sleepers in selected sections, and arrangement of ballast;
- d) Improvement of equipment maintenance workshops;
- e) Improvement of signalling and communication systems;
- f) Various expenses for improvement of level crossings, important repairs on buildings, replacement of some maintenance equipment;
- g) Investment categories shown in Exhibit A have already been subject to project evaluation.
 - i) Investments in locomotives will allow:
 - improvement of ton-km by power unit
 - improvement of locomotives availability
 - savings in locomotives maintenance cost per traffic unit
 - transportation of additional forecast traffic
 - ii) Investments in rolling stock will allow:
 - improvement in average load of wagons
 - improvement of wagons availability

- improvement of wagons utilization (also as a consequence of improved operations planning)
- savings in wagons maintenance cost
- transportation of additional forecast traffic

iii) Investments in track will allow:

- improvement in wagons turnaround due to the expansion of marshalling yards
- higher load per axle
- running of heavier trains
- running of longer trains through building of longer side tracks
- increase of track capacity in terms of trains per day, thanks to the improvement of signaling and telecommunications system
- savings in track maintenance cost
- transportation of additional forecast traffic

iv) Investments in equipment maintenance workshops will allow:

- maintenance of more power units
- absorption of the greater work load due to a greater number of units in the fleet
- improvement of locomotives availability
- savings in locomotives maintenance cost

The present traffic is 700,000 tons per year. Traffic is expected to increase if the investments program is implemented, due to several factors:

- a) greater available capacity;
- b) more demand as a consequence of a higher level of railway service offered; and
- c) improvement of commercial function.

Forecasts of traffic increase are:

1st year:	
2nd year:	250,000 tons
3rd year:	250,000 tons

A. Incomes

1. Freight Revenues: Year one - no change; year two - increase of \$5,360,000; year three - further increase of \$5,360,000.
2. Miscellaneous Revenues: Remain static.

B. OPERATING COSTS

1. Track Maintenance

Current Annual Cost		3.25 million
Year 1	- No Change	-
Year 2	- Traffic increase of 35%	
	Add: (To simplify,	<u>1.14</u> million
	expense was supposed to be	4.39 million
	prop. to traffic) Less:	<u>0.39</u> million
	Revised annual cost	4.00 million
Year 3 - Further traffic increase		
	of 35%, Add	<u>1.14</u> million
		5.14 million
	Less: further savings	<u>0.39</u> million
	Revised Annual Cost	<u>4.75</u> million

2. Locomotive Maintenance

Present fleet: 10 locos. Carry 700,000 tons p.a. i.e., each loco carries 70,000 tons p.a.

At the end of year 1 4 new locos arrive, 2 old locs are scrapped and at end of year 3 a further 4 new locos arrive, and 3 more old locos are scrapped.

Maintenance Costs - Current year \$ 1.04 million

(i.e. \$.104 million p.a. per loco)

Year 1 - No change

Year 2 - Scrap 2 locos - save on maintenance (0.21) million

Add 4 new locos - cost only \$.075 p.a. each) 0.30 million

Revised annual cost 1.13 million

Year 3 - Scrap 3 locos - save (0.32) million

 Add 4 more new locos 0.30 million

Revised annual cost 1.11 million

2. Wagons Maintenance

Present fleet: 200 wagons. Carry 700,000 tons p.a. i.e., each wagon carries 3,500 tons p.a.

At the end of year 1 80 new cars arrive, 20 old cars are scrapped and at end of year 2, a further 80 cars arrive, and 30 more old cars are scrapped.

Maintenance Costs - Current year \$ 1.56 million

(i.e. \$0.0078 million per wagon, p.a.)

New cars expected to cost \$.0055 million each p.a.

Year 1 - No change

Year 2 - Scrap 20 cars. Save maintenance

costs. (0.16) million

Add 80 new cars (80 x .0055) 0.44 million

Revised annual cost 1.84 million

Year 3 - Scrap 39 cars - save (0.23) million

Add 80 new cars 0.44 million

Revised annual cost 2.05 million

4. Train Operating Costs

a) Fuel, Lube and Materials

Current cost for 10 locos = \$ 0.94 million
(i.e. \$.094 million p.a. per loco)

Year 1 - No change

Year 2 - Scrap 2 old locos. Save
fuel, etc. cost (0.18) million

Add 4 new locos, more powerful,
consume more fuel, etc. Assume
\$.07 million p.a. per loco 0.28 million

Revised annual cost 1.04 million

Year 3 - Scrap 3 more old locos
Save (0.18) million

Plus 4 new locos 0.28 million
Revised annual cost (fuel, lube, etc.) 1.05 million

b) Labor Cost

Current Cost 0.62 million
(i.e. \$.062 million p.a. per loco)

Year 1 - No change

Year 2 - Net addition of 2 locos (net) 0.12 million

Revised annual cost (labor) 0.74 million

Year 3 - Add one additional loco (net) 0.06 million

Revised annual loco labor cost 0.80 million

Summary - Train Operating Costs

Year 1 (\$0.94 + 0.62 million) 1.56 million

Year 2 (\$1.04 + 0.74 million) 1.78 million

Year 3 (\$1.05 + 0.80 million) 1.85 million

5. Stations and Yards

Studies at major stations and yards indicate that their operating costs would rise by about \$0.33 million in year 2, with a further \$0.33 million in year 3.

6. Administration and General Costs

These are forecast to rise by about \$0.4 million p.a. in each of years 2 and 3

7. a) Depreciation and b) Loan Interest

While individual project evaluations may take into account specific provisions for depreciation and loan interest, for financial presentation purposes such elements should be eliminated, and annual provisions calculated for each of these two cost items, on the basis of:

i) Depreciation:

Current depreciation, less annual provision for assets being scrapped, plus additional provision for new assets.

ii) Loan Interest:

Interest payable on current debt, plus that for assumed new debt, depending on the terms expected for such debt

Calculations are (figures rounded to first decimal point, for convenience).

a) Depreciation

Current provision is \$2.0 million p.a.

(i.e. 5% current gross fixed assets value of \$40.0 million)

Year 1 - No change	\$ 1.95 million
Year 2 - Additional investment of \$13.6 million (in year 1). Assume 5% p.a.	0.68 million
Less Scrapping of 2 locos = 0.10	
10 wagons = 0.05	(0.15) million
Revised annual charge	<u>2.48</u> million
Year 3 - Additional investment of \$13.6 million	0.68 million
Less Scrapage of 3 locos = 0.15	
30 wagons = 0.075	(0.225) million
Revised annual charge	<u>2.395</u> million

- Say \$2.94 million

b) Loan Interest

Current Debt \$20.0 million. Interest 10% p.a. with repayment over 7 years.

Year 1: Existing debt	20.0 million	Repay	2.5 million
Additional debt	10.0 million		
	30.0 million	- 2.5 =	27.5 million

For interest take midpoint, i.e. $(20.0 + 5.0 - (1.25)) = 23.75$ million at 10% = 2.375, say \$2.38 million.

Year 2: Existing debt	27.5 million	Repay	2.5 million
Additional debt		<u>10.0</u> million	
	37.5 million	- 2.5	= 35.0 million

For interest take midpoint, i.e. $(27.5 + 5.0 - (1.25)) = 31.25$ at 10% = 3.125 - say \$3.12 million.

(Assume new debt also at 10% interest rate, payable over 7 years with \$0.5 million payable in year 3, and \$2.5 million payable thereafter).

The following Tables 1 to 6 give a detailed description of the financial impact of the investments plan proposed for the XYZ Railway.

Table 1 indicates the cost of the proposed investment against each item of the sub-project, for each year of the investment plan period. It also indicates, where possible, assumed annual benefits, in the form of operating or maintenance cost savings, together with additional operating costs assumed to be associated to investments, all as explained in Case B. However, incremental operating benefits are not allocated to any specific item, but are given in annual totals.

Table 2 give the forecast income accounts, relating solely to the project items, for years 1, 2 and 3 of the investment plan period. Annual net revenues in subsequent years would rise, due to annual interest reducing as the long-term debt is repaid.

Table 3 gives the forecast cashflows for project items only, in detail for project years 1, 2 and 3 in brief summary form for subsequent years.

Table 4 gives the forecast Project Balance Sheets for the same period. Because on Table 2, credit is taken for the depreciation saved by scrapping old equipment, but on Table 4, as only the new assets are shown, and therefore the accumulated depreciation is that for those new assets only, the two sides of the project balance sheet will not balance in years 2 and 3, due to the accumulated negative depreciation on old, scrapped assets. This is consequently shown separately, as an adjustment.

Tables 5 and 6 give the consolidated annual Profit and Loss Accounts, Cashflows and Balance Sheets. Each Table gives separately the movements due to:

- a) the existing network and
- b) the new project assets.

The question of whether the savings in annual depreciation, due to the scrapping of old locomotives and rolling stock, should be credited to the project, or to the existing network, is a matter of judgment. However,

as without the scrapped equipment the existing network could not handle the current level of traffic, it is considered that the project should accept these savings. It may also be argued that, in these circumstance, the project should also be credited with a share of the operating revenues, still credited to the existing network at the current level. This would increase the profitability of the project investment.

TABLE 1
COSTS AND BENEFITS COMPARED WITH BASE YEAR
(in \$ Million)

	BENEFITS				ANNUAL NET BENEFITS*
	INVESTMENT COST	ADDITIONAL REVENUES	ADDITIONAL OPERATING COSTS	COST SAVINGS	
<u>YEAR NO. 1</u>					
Locomotives (4 No)	5.00	--	--	--	--
Freight Cars (80 No)	6.00	--	--	--	--
Track Improvement	2.50	--	--	--	--
Workshop Equipment	<u>0.10</u>	--	--	--	--
Annual Total	<u>13.60</u>	--	--	--	--
<u>YEAR NO. 2</u>					
Locomotives (4 No)	5.00		M. 0.30 F.L. 0.40	0.21 0.18	
Freight Cars (80 No)	6.00		M. 0.44	0.16	
Track Improvement	2.50		M. 1.14	0.39	
Workshop Equipment	<u>0.10</u>	--	--	--	*
Annual Total	<u>13.60</u>	<u>5.36</u>	<u>(2.28)</u>	<u>0.94</u>	<u>4.00</u>
<u>YEAR NO. 3</u>					
Locomotives	--		M. 0.60 F.L. 0.74	0.53 0.45	
Freight Cars (80 No)			M. 0.88		0.39
Track Improvement	--		M. 2.28		0.78
Workshop Equipment	--	--	--	--	
Annual Total	--	<u>10.72</u>	<u>(4.50)</u>	<u>2.15</u>	<u>8.37</u>
<u>YEAR NO. 4</u>					
Locomotives	--		M 0.60 F.L. 0.74	0.53 0.45	
Freight Cars			M. 0.88	0.39	
Track Improvement	--		M. 2.28	0.78	
Workshop Equipment	--	--	--	--	
Annual Total	--	<u>10.72</u>	<u>(4.50)</u>	<u>2.15</u>	<u>8.37</u>

* From these annual benefits must be deducted the additional station/ yard and Administration/General Costs, due to the additional Traffic handled, i.e. in Year 2, \$0.73 million and in Year 3, \$1.46 million, giving revised annual net benefits of \$3.29 million and \$6.92 million respectively.

** Benefits from workshops investment are part of the locomotive and freight car maintenance costs and savings.

TABLE 2
FORECAST PROJECT INCOME ACCOUNTS

	YEAR 1	YEAR 2	YEAR 3
<u>Operating Revenues (incremental)</u>			
Freight Revenues	--	5.36	10.72
Other Revenues	--	--	--
Total Operating Revenues	<u>--</u>	<u>5.36</u>	<u>10.72</u>
<u>Operating Expenses (incremental)</u>			
Track Maintenance (net)		0.75	1.50
Locomotive maintenance (net)		0.09	0.07
Freight car maintenance (net)		0.28	0.49
Train operations - Fuel, etc.		0.10	0.11
- Labour		0.12	0.82
Stations and yards		0.33	0.66
Administration and General		0.40	0.80
Total Working Expenses	<u>--</u>	<u>2.07</u>	<u>3.81</u>
Depreciation	--	0.53	0.99
Total Operating Expenses	<u>--</u>	<u>2.60</u>	<u>4.80</u>
Net Operating Revenues	<u>--</u>	<u>2.76</u>	<u>5.92</u>
Loan Interest (incremental)	<u>0.50</u>	<u>1.50</u>	<u>1.98</u>
Net Revenue	<u>(0.50)</u>	<u>1.26</u>	<u>3.94</u>

TABLE 3
FORECAST CASHFLOWS - PROJECT ONLY
(In \$ Millions)

	YEAR 1	YEAR 2	YEAR 3 #1	TOTAL YEARS 1, 2, 3
Cash Required:				
Debt Service - Loan Interest	0.50	1.50	1.98	3.98
- Repayment	--	--	<u>0.50</u>	<u>0.50</u>
Sub-Total - Debt Service	0.50	1.50	2.48	4.48
Capital Investm.	<u>13.60</u>	<u>13.60</u>	--	<u>27.20</u>
Total Cash Required	<u>14.10</u>	<u>15.10</u>	<u>2.48</u>	<u>31.68</u>
Cash Available:				
Incremental Revenues	--	5.36	10.72	16.08
Less Incremental Operating Costs *2		(2.07)	(3.81)	(5.88)
Net Incremental Revenues		3.29	6.91	10.20
Borrowings - Long Term Debt	10.00	10.00	--	20.00
- Short Term Debt	<u>4.00</u>	<u>1.00</u>	<u>(5.00)</u>	--
Total Cash Available	<u>14.00</u>	<u>14.29</u>	<u>1.91</u>	<u>30.20</u>
Net Annual Cash/Working Capital				
Decrease	<u>(0.10)</u>	<u>(0.81)</u>	<u>(0.57)</u>	<u>(1.48)</u>

Note: *1 After year 3, annual cash flows would become positive as follows:

Year No.	Net Incremental Revenues	Loans Interest	Repayment	Net Cash
		(\$ Million)		
4	6.91	1.83	2.50	2.58
5	6.91	1.58	2.50	2.83
6	6.91	1.33	2.50	3.08
7	6.91	1.08	2.50	3.33
8	6.91	0.83	2.50	3.58
9	6.91	0.58	2.50	3.83
10	6.91	0.33	2.50	4.08
11	6.91	0.08	2.00	4.83
12	6.91	--	--	6.91

*Note: *2 Before depreciation

TABLE 4
FORECAST PROJECT BALANCE SHEETS

	YEAR 1	YEAR 2	YEAR 3
<u>ASSETS</u>			
Fixed Assets - Gross:			
Locomotives	5.00	10.00	10.00
Freight Cars	6.00	12.00	12.00
Track	2.50	5.00	5.00
Workshops	0.10	0.20	0.20
	-----	-----	-----
Total Gross Value	13.60	27.20	27.20
Less Accumulated Depreciation*	--	0.68	2.04
	-----	-----	-----
Net Fixed Assets	13.60	26.52	25.16
	-----	-----	-----
Total Assets	13.60	26.52	25.16
	-----	-----	-----
<u>LIABILITIES</u>			
Net Working Capital			
- Deficit	0.10	0.91	1.48
Long Term Debt	10.00	20.00	19.50
Short Term Debt	4.00	5.00	--
Accumulated Surplus (Deficit)	(0.50)	0.76	4.70
Adjustment (see Note **)	--	(0.15)	(0.52)
	-----	-----	-----
Total Liabilities	13.60	26.52	25.16
	-----	-----	-----

* This is depreciation on project assets. The lower figure given on Table 2 is as explained below.

** Depreciation saved by scrapping old locomotives and freight cars, taken as benefits in Table 2, but assets not present on this balance sheet.

TABLE 5
CONSOLIDATED PROFIT AND LOSS ACCOUNTS
(8 Millions)

BASE YEAR (EXISTING)	YEAR 1					YEAR 2					YEAR 3							
	ADD PROJECT	LESS EXISTING	ANNUAL EXISTING	TOTALS PROJECT	CONS. TOTAL	ADD PROJECT	LESS EXISTING	ANNUAL PROJECT	TOTALS EXISTING	CONS. PROJECT	ADD PROJECT	LESS EXISTING	ANNUAL PROJECT	TOTALS EXISTING	CONS. PROJECT	TOTALS TOTAL		
Revenues																		
Freight Revenues	15.00	--	--	15.00	--	15.00	5.36	--	--	15.00	5.96	20.36	5.36	--	--	15.00	10.72	25.72
Miscellaneous	1.00	--	--	1.00	--	1.00	--	--	--	1.00	--	1.00	--	--	--	1.00	--	1.00
Total Revenues	16.00	--	--	16.00	--	16.00	5.36	--	--	16.00	5.96	21.36	5.36	--	--	16.00	10.72	26.72
Track Maintenance	3.25	--	--	3.25	--	3.25	1.14	--	(0.39)	3.25	0.75	4.00	1.14	--	(0.39)	3.25	1.50	4.75
Loco Maintenance	1.04	--	--	1.04	--	1.04	0.30	--	(0.21)	1.04	0.09	1.13	0.30	--	(0.32)	1.04	0.07	1.11
Freight Maintenance	1.56	--	--	1.56	--	1.56	0.44	--	(0.16)	1.56	0.28	1.84	0.44	--	(0.23)	1.56	0.49	2.05
Train Operation:																		
Fuel, Lube, etc.	0.94	--	--	0.94	--	0.94	0.28	--	(0.18)	0.94	0.10	1.04	0.28	--	(0.27)	0.94	0.11	1.05
Labor	0.62	--	--	0.62	--	0.62	0.12	--	--	0.62	0.12	0.74	0.06	--	--	0.62	0.15	0.80
Stations and Yards	2.34	--	--	2.34	--	2.34	0.33	--	--	2.34	0.33	2.67	0.33	--	--	2.34	0.66	3.00
Admin. & General	1.30	--	--	1.30	--	1.30	0.40	--	--	1.30	0.40	1.70	0.40	--	--	1.30	0.60	2.10
Total Working Costs	11.05	--	--	11.05	--	11.05	3.01	--	(0.94)	11.05	2.07	13.12	2.95	--	(1.21)	11.05	3.81	14.86
Depreciation	1.95	--	--	1.95	--	1.95	0.68	--	(0.15)	1.95	0.53	2.48	0.68	--	(0.22)	1.95	0.99	2.94
Total Operating Costs	13.00	--	--	13.00	--	13.00	3.69	--	(1.09)	13.00	2.60	15.60	3.63	--	(1.43)	13.00	4.80	17.80
Net Operating Revenue	3.00	--	--	3.00	--	3.00	1.67	--	1.09	3.00	2.78	5.78	1.73	--	1.43	3.00	5.92	8.92
Loan Interest	(2.00)	(0.50)	(0.12)	(1.88)	(0.50)	(2.38)	(1.00)	(0.26)	--	(1.62)	(1.50)	(3.12)	(0.48)	(0.25)	--	(1.37)	(1.98)	(3.35)
Net Revenue	1.00	(0.50)	(0.12)	(1.12)	(0.50)	0.62	0.67	0.26	1.09	1.38	1.28	2.64	1.25	0.25	1.43	1.63	3.94	5.57

TABLE 6
XYZ RAILROAD, CONSOLIDATED CASHFLOWS
(\$ Millions)

	BASE YEAR	ADD EXISTING PROJECT	LESS EXISTING PROJECT	ANNUAL TOTAL		
Year 1						
Cash Required:						
Debt Service						
- Loan Interest	2.00	--	0.50	0.12	--	2.38
- Repayment	--	2.50	--	--	--	2.50
Capital Investment	--	--	18.60	--	--	18.60
Total Required	<u>2.00</u>	<u>2.50</u>	<u>14.10</u>	<u>0.12</u>	--	<u>18.48</u>
Cash Available:						
Operating Revenues	16.00	--	--	--	--	16.00
Less Working Expenses	11.05	--	--	--	--	11.05
Cash Generated	<u>4.95</u>	--	--	--	--	<u>4.95</u>
Borrowing						
- Long Term Debt	--	--	10.00	--	--	10.00
- Short Term Debt	--	--	4.00	--	--	4.00
Total Available	<u>4.95</u>	--	<u>14.00</u>	--	--	<u>18.95</u>
Net Cash/Working Capital Increase	<u>2.95</u>	<u>(2.50)</u>	<u>(0.10)</u>	<u>0.12</u>	--	<u>0.47</u>
Year 2						
Cash Required:						
Debt Service						
- Loan Interest	2.00	--	1.50	0.38	--	3.12
- Repayment	--	2.50	--	--	--	2.50
Capital Investment	--	--	18.60	--	--	18.60
Total Required	<u>2.00</u>	<u>2.50</u>	<u>15.10</u>	<u>0.38</u>	--	<u>19.22</u>
Cash Available:						
Operating Revenues	16.00	--	5.86	--	--	21.36
Less Working Expenses	11.05	--	3.01	--	0.94	13.12
Cash Generated	<u>4.95</u>	--	<u>2.85</u>	--	<u>0.94</u>	<u>8.24</u>
Borrowing						
- Long Term Debt	--	--	10.00	--	--	10.00
- Short Term Debt	--	--	1.00	--	--	1.00
Total Available	<u>4.95</u>	--	<u>11.00</u>	--	<u>0.94</u>	<u>19.24</u>
Net Cash/Working Capital Increase	<u>2.95</u>	<u>(2.50)</u>	<u>(1.75)</u>	<u>0.88</u>	<u>0.94</u>	<u>0.02</u>
Year 3						
Cash Required:						
Debt Service						
- Loan Interest	2.00	--	1.98	0.63	--	3.35
- Repayment	--	2.50	0.50	--	--	3.00
Total Cash Required	<u>2.00</u>	<u>2.50</u>	<u>2.48</u>	<u>0.63</u>	--	<u>6.35</u>
Cash Available:						
Operating Revenues	16.00	--	10.72	--	--	26.72
Less Working Expenses	11.05	--	5.95	--	2.15	14.86
Cash Generated	<u>4.95</u>	--	<u>4.76</u>	--	<u>2.15</u>	<u>11.85</u>
Borrowing						
- Short Term Debt	--	--	--	--	(5.00)	(5.00)
Total Available	<u>4.95</u>	--	<u>4.76</u>	--	<u>(2.85)</u>	<u>6.86</u>
Net Cash/Working Capital Increase	<u>2.95</u>	<u>(2.50)</u>	<u>2.28</u>	<u>0.63</u>	<u>2.85</u>	<u>0.51</u>

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