THE RAILWAYS PROBLEM

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Transportation and Water Department
The World Bank
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Restricted Sector Report.
Despite the rise of other transport technologies, railways are still the most efficient mode for handling dense movements of people and freight and are critical for the industries and exports of many developing countries (paras. 2.10-2.11, 5.11, 6.02). Current economic and technological developments, notably the increase in energy prices, are opening new opportunities for railway services and increasing the importance of improving railway performance generally, and in particular their response to evolving market conditions (paras. 2.20-2.25, 2.28-2.31). However, following the earlier era of near monopoly, they have tended to become slow-moving public administrations, now requiring extensive structural change. In most cases change has been slow, due partly to a confusion between state and railway functions and to the misconception that investment alone can resolve the issues, when the need is for changes of policies, organizational structures and facilities — the latter involving both investments and disinvestments in response to traffic changes (para. 6.01). As a result many railways have become a bottleneck to development as well as a growing drain on Government financial resources (paras. 1.01-1.03, 3.01, 4.04).

Action is needed at three levels.

First, Governments should not only avoid arbitrary interventions and uneconomic investments but also take positive action to steadily strengthen the functioning of the transport market by
- derestricting competing modes and taxing them more appropriately (para. 4.25)
- demanding and supporting suppression of uneconomic railway services (paras. 4.26, 3.30-3.33)
- increasing railway management’s own decision-making powers (paras. 4.27-4.29 and 3.05)

Structural change is not helped by government subsidies, other than for one-time financial corrections and for unprofitable lines as a transitional measure (paras. 4.06-4.14). Existing subsidy arrangements should be reorganized to exert strong pressure for elimination of the need for subsidy (paras. 4.19-20, 4.36, 4.40).

Second, the railway’s own capacity for structural change must be increased by wider recruitment of managerial staff, training courses specifically in railway management, management information systems for proper supervision of delegated responsibilities, and substantial expansion of staff training efforts (paras. 3.09-3.13). Particular attention is needed to three closely interrelated functions
- marketing, to design services and negotiate commercial contracts (paras. 4.22, 2.31-2.33)
- costing, to specify how changes in services or operations would affect costs (paras. 4.23-4.24)
- operations management, to identify and implement measures to increase profitability (paras. 4.21, 3.39-3.41).

Third, investment projects themselves must be designed more selectively and carefully, and with better focus on the interrelated technical obstacles to accomplishment of each stage of structural change (paras. 5.15-5.17, 6.07). Track improvement and electrification, which will be increasingly important because of existing lags, should be concentrated on lines with substantial traffic potential, better prepared and scheduled more realistically (paras. 3.34-3.38). Workshop improvements must receive closer and more comprehensive attention to overcome execution delays and very high existing locomotive outage rates (paras. 3.25-3.29). Investment programs need to be accompanied by agreed Action Plans focussed at the specific short-term measures necessary to make better use of existing and new physical assets (paras. 3.44-3.45, 3.17-3.20).

The Bank has loaned over $5 billion for railway development. Though progress has been made in many cases, overall the pace of improvement has been too slow to warrant a mere continuation of past practices. The Bank should be prepared to undertake the more intensive effort required, but should concentrate it on those railways where Government and management wish seriously to embark on the structural transformation that is needed (paras. 6.22-6.23, 5.21, 5.23). The effort should be supported not only by railway loans but by appropriate actions in other transport lending and by general policy advice (paras. 5.22, 6.10, 6.17).
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Overview

1. Although railways continue to be one of the most important means of overland transport, they have been a steadily growing cause of concern in almost all countries, developing and industrialized alike. In the developing countries, their policies and organizational structures evolved at a time when they enjoyed near-monopolies for land transport. Their role has changed dramatically over the last 30-40 years, not only because of competition from road and air services, but also because economic, technological and political changes have altered the patterns of transport demand. However they are still the most effective mode for handling dense movements of people and freight. The industries and exports of many developing countries are critically dependent on railways. Recent economic and technical trends are moving the balance of economic advantage at the margin in favor of railways: higher energy prices, new flows of raw materials, technical advances in handling and terminal operations, and containerization. To take advantage of these opportunities requires a commercial approach, involving less Government regulation, greater management autonomy, improved costing, marketing and planning. Structural change is needed. Unfortunately, Government authorities, and the general public, often perceive railways as a public service, to be shielded from commercial pressure. This confusion between railway and state functions lies at the root of many of the railways' inefficiencies, which are frequently reflected in large Government subsidies.

ii. The World Bank has long been heavily involved in assisting railways to adapt to their changing role. Direct lending to railways through June 30, 1981 amounted to nearly US$5,500 million. Increasing highways lending has reduced the share of railways in the transport total over time. Also some countries still borrowing from the Bank for other purposes have ceased to be clients in the railways field. But the Bank has currently some 25 active railway borrowers, more than half of whom received their first loan from the Bank since 1970. About five loans have been made each year since the mid-1970s. Railways accounted for 22% of transport lending in the five years FY 1977-81, and for 36% of the total investment supported through Bank/IDA transport lending approved in this period.

iii. The railways have figured large among 'problem projects' in the Bank's periodic reviews of project implementation. With few exceptions, railway borrowers' financial performance has fallen short of expectations. Generally, improvements in operations, accounting, planning and organization have also been slower than expected. Ex-post re-estimates of economic returns are available for some 25 Bank-assisted projects. They indicate returns falling below the projected level in about 66% of cases, below 15% in about half the cases, and occasionally even below 10%. Railway projects are also expensive to the Bank in terms of staff-time required for preparation and appraisal.
iv. One of the main questions that this report addresses is whether, under these circumstances, railways should be dropped from the Bank's portfolio. The issue has been addressed by a thorough review of Bank-assisted railway projects, and of the experience of railways more generally. It concludes that dropping railways altogether from future Bank lending would not be desirable. There are four principal reasons.

v. First, the Bank has demonstrated a capacity to contribute successfully to the difficult reforms required. The rates of return cited above are based on standard economic analysis and focus on the direct costs and benefits of the particular investments included in the project partly financed by the Bank. They do not reflect the overall difference made to the performance of the country's railway and transport sector by the involvement of the Bank. Yet contributions of this sort are particularly important in railways lending. Reforms have taken place, often more slowly than targeted but undoubtedly earlier and quicker than without Bank involvement. The following list of achievements illustrates their broad range in subjects and countries: staff reductions (Brazil, Indonesia, Mali), line closures (Argentina, Yugoslavia, Thailand), service closures (Mexico, Senegal), basic planning capacities (India, Mexico, Yugoslavia), opening procurement sources (Ivory Coast, Pakistan), commercial marketing (Malaysia, Spain, Thailand), improved costing and tariff structures (Algeria, Brazil, Taiwan, Tunisia), strengthened basic institutional structures (Korea, Senegal), new technologies (unit exchange maintenance system in India, wagon control in Mexico), improved traffic operating techniques (Bolivia, Pakistan, Spain), staff training arrangements (Cameroon, Sudan). One benefit that is frequently attached to Bank participation is avoidance of low-priority investment. The sums involved have sometimes been very substantial, as much as US$ 1 billion.

vi. These reforms, and Bank emphasis on financial discipline, have also strengthened borrowing railways' financial performance, which remains superior in most cases to that of many of the developed countries' railways. Improvements in financial performance have been achieved relatively quickly in many cases.

vii. Second, the Bank's role in helping to bring about railway reform is largely unique. The economic role of the railways has to be determined, and policies, organizational structures and investments planned accordingly. Uneconomic lines and services have to be closed and redundant staff reduced. Deregulation measures have to be developed, involving other transport modes as well. Important pressure groups frequently oppose the policies and measures needed to improve efficiency, a problem sometimes exacerbated by the concern of industrialized countries to find markets for their railway equipment. Consultants can provide specialist advice, but not the patient advocacy that is often required. The Bank can maintain an objective stance and its loans can assist Governments in justifying unpopular measures.
viii. Third, railways retain a key role in most developing countries. Development poses very large transport needs, and major cost savings can be made by efficiently exploiting the comparative advantage of railways. Overall transport requirements, both for goods and passenger travel, tend to grow much faster relative to GNP in developing than in developed countries. Increasing relative prices of energy will slightly reduce growth of overall transport requirements but can marginally improve the comparative advantage of railways. It becomes more important to improve the efficiency of railways to enable them to capture as large a share as possible of the dense traffics for which they are well-suited (e.g., coal and minerals, foreign trade on legs between main production centers and border points, large flows of containerized manufactures and agricultural produce, and passenger flows between large cities and into their centers.)

ix. Fourth, the apparently high administrative cost to the Bank of railway loans needs to be put in perspective. Because railway loans are typically large, staff-time expenditure on them per dollar of lending is not very different from that for other transport projects and is below the Bank-wide average. Moreover, the Bank has often been able to raise large amounts of supplier-credit and bilateral-aid co-financing for railway projects, with co-lenders sometimes insisting on the Bank taking the lead role in appraisal and supervision.

x. While abandonment of railways lending is not justified, it is nonetheless clear that progress under many past railway loans has been too slow to warrant mere continuation of past practices. Conditionality for lending needs to be tightened, so that resources are concentrated on those projects which offer a greater assurance that Bank assistance will have a significant effect. Progress on all major dimensions of agreed reform should be achieved before follow-on loans are made. The Bank's approach to railways lending needs to be more selective, better focused and more realistic. These points are developed in greater detail in the following paragraphs.

Selectivity

xi. The Bank has traditionally been selective in regard to railway projects. It has insisted that the railway should have a clear economic role, taking account both of evolving economic geography and the prospective availability of high-level management capacity. It has played a valuable role in discouraging planned investment in regional and national networks that had no long-term future, and it has sometimes effectively helped bring about extensive closures. Bank insistence on investments being preceded by feasibility studies has helped upgrade the quality of investment programs.

xii. More care, however, is needed on financial, engineering and economic aspects of track works, whether renewals, realignments or new construction. Among railway project components, these have been most subject to extensive delays, large cost over-runs and doubtful economic impact. Improvements even on major lines to permit maximum freight-train running speeds in excess of about 60 kph need particularly careful and comprehensive feasibility analysis. For lines carrying less than about 1 million gross tons (400,000 net tons) even so-called 'essential renewals' require very careful scrutiny.
One type of track improvement which is likely to be important in coming years is electrification. It may result in substantial reductions of energy costs, depending on how electricity is generated and its alternative uses as compared to petroleum. It increases operational efficiency, mainly because electric locomotives are easier to maintain than diesels, and may increase track utilization and productivity of train staff. However it involves large capital outlays. Normally electrification remains justifiable only at high traffic densities, of the order of 10 million gross tons (4 million net tons) p.a. There are extensive mileages of unelectrified track in some countries which already have such traffic densities and which present a good prima facie case for electrification.

But greater selectivity than in the past is principally needed in the sense of requiring, as precondition for lending, a firmer Government commitment to the basic objective of commercially oriented operation of the railway. This has always been the basic objective underlying the Bank's railways work. It has been a relevant objective even for work with centrally planned economies, which are trying to introduce more flexibility into the operation of their transport markets and to improve the realism of cost and service comparisons underlying modal choices for shippers. The analyses in this report reconfirm the validity of the commercial objective.

The Bank should in future require of Governments, as conditions precedent to the making of a loan, the start of action, rather than simply statements of intent, on any needed measures in three areas of transport policy central to achievement of the commercial objective: reduced regulation and more appropriate taxation of competing transport modes; elimination of economically unjustified railway operations and corresponding reductions of staff; and increase of the operating freedom allowed railway management in respect of such matters as budget reallocations, negotiation of traffic contracts, wages and salaries. Many borrowing countries are at early stages of progress along these lines, and full accomplishment of all necessary measures can take a decade or two. But these are such critical dimensions of the whole structural change process that unless Government feels sufficiently committed to them to make a start, it must remain doubtful whether Bank involvement can be worthwhile. In cases where improvements of broad transport sector policies are particularly important, there may be advantage to making a single combined loan for investments in several modes, with the main emphasis being given to such policy reforms.

Initiation of appropriate steps in these three transport-policy areas should be a more important criterion of eligibility for a railway borrower than current financial performance. In some cases the Bank may even have to require the initiation or temporary increase of Government subsidies in order to safeguard the efficiency of railway operations and the adequacy of maintenance, while the necessary organizational and operational reforms are taking place. On the other hand, further progress in these three aspects of transport policy clearly has to move in step with measures to reduce the Government subsidies which most borrowing railways are now receiving.
xvii. The efficacy of these broad lines of general transport policy has been clearly demonstrated by various measures taken over the past three decades in a wide range of countries, such as Australia, Canada, Pakistan, Sweden, the U.K., the U.S., Yugoslavia, and, to a lesser extent, by many others. Despite the obstacles of strong sectional interests, railway reforms have been moving in many continental European countries. Although it has not in the past given this area the emphasis recommended here, the Bank has already successfully contributed to Governmental action to strengthen the commercial orientation of the transport sector, most notably in Brazil and Korea. Particularly important line closures were accomplished in Argentina in the middle 1970s during preparation for a Bank railway loan.

xviii. The report examines in some detail the main categories of argument presently used to justify railway subsidies and finds them severely wanting. Availability of subsidies reduces the pressure for measures to cut costs and attract customers by operational improvements, leaves management less protected against demands from particular regions or customers for special concessions, inhibits rational staff and wage policies, discourages a strict approach to disinvestment and investment, and weakens the morale of the railway enterprise.

xix. The most important railway subsidies in borrowing countries have originated from efforts to hold down railway tariffs as an anti-inflationary measure. Such subsidies cannot in practice reduce inflation and may well increase it, depending on how they are financed and on their effects on internal railway operating efficiency and the demand for railway services. A second justification for subsidies is to improve income-distribution, but studies of actual experience suggest that most of the direct benefits tend to go to better-off people. Indirect effects on wages and rents and on regional development patterns can also have adverse income-distribution consequences. Moreover passenger subsidy policies appear to have had negative effects on railway traffic growth in several developing countries, due to the resultant difficulty of maintaining or improving service quality. The third main argument for subsidies is to compensate railways for supposed disadvantages vis-a-vis other modes. Studies suggest that the actual effect of rail subsidies in reducing the number of cars using city streets or in improving the distribution of freight between rail and road is very limited. More direct measures should be used instead to charge other modes appropriately. Subsidies are justified only as a one-time measure to avoid burdening current and future railway users with the pension costs of excess personnel (or with debt-service on facilities withdrawn from service), or, transitionally, for lines and services that are unprofitable but worth maintaining until an alternative service is provided or renewal is needed.

xx. Therefore the appropriate target operating ratio (ratio of operating expenses, including depreciation, to operating revenues) for a railway not significantly expanding is at most 100 and, for one needing minor expansion and modernization, perhaps 95. Administrative principles recommend such 'budgetary equilibrium' as an invaluable tool for ensuring disciplined management. Economic principles recommend pricing for railways, as for other transport modes, at the short-run marginal costs of providing the various services, with mark-ups for less price-elastic traffic as necessary to
balance the overall budget. A number of current railway borrowers, such as Bolivia, India, Kenya, Korea and Romania are producing financial results largely consistent with these recommendations, and most have been moving, albeit slowly, to aligning their tariff structures with marginal costs.

xxi. Thus the Bank needs to take a firmer stand against railway subsidies and to supplement overall financial performance targets with more precise and comprehensive measures to combat them. The Bank should require specific studies to justify any proposed subsidies, and should seek to agree specific phased programs for their reduction. In cases where they are most difficult to eliminate, such as for suburban services or for unprofitable lines, it should promote institutional measures that will rationalize or help reduce them. Structural Adjustment Loans could play an invaluable supplementary role in helping to reduce and rationalize subsidies and to deal with problems that railways share with other public-sector enterprises.

Focus

xxii. An important issue in railway lending is the selection in each case of the appropriate areas of concentration or focus. The problem is inherent to railways, due to their complex system nature and the high degree of interdependence among their parts.

xxiii. Focus has to be identified and developed during project preparation, and more effort and attention should be devoted to this stage of railway projects. The first step, in which the Bank itself must generally play a major role, is broad diagnosis of the railway’s economic potential and of the most important problems that it faces. Experienced judgment is needed: to determine how many problems the railway has the management capacity to resolve in the near term; to select the priority problems to attack; to deepen understanding of the specific obstacles to solution of these problems and identify remedial measures; and to formulate an appropriate action program. Initial diagnosis needs to be followed by detailed studies in the selected problem areas, and only upon completion of these, perhaps a year or two later, would the project be ready for appraisal.

xxiv. The first projects in a country should be more strictly limited than in the past to what could realistically be accomplished in two-and-a-half or three years. Most railway projects have been designed to cover such a relatively short period but have in practice taken considerably longer to execute. This has had undesirable effects in terms of discouraging needed review and revision of targets and investment allocations.

xxv. Focus in early loans may also be assisted by using a wider variety of project designs. The traditional Bank railway project has consisted of a short time-slice of the borrower’s overall investment program and has therefore included sub-projects in many different areas. Experiments have begun in recent years with various types of more limited project shape, with investments wholly devoted to a particular line, function or type of service. One of the most promising of such more limited project shapes is
the regional one, avoiding dispersion of project effort and attention over a large national network, concentrating on a region with particular potential for improved railway services, and facilitating introduction of managerial and operational improvements which can later be spread to other parts of the system. Care has to be taken that in financing such projects the Bank is not enabling some uneconomic investment, or deferral of needed economizing measures, elsewhere in the network. Operational interdependencies need to be carefully considered, to make sure that a partial project will not have its impact nullified by weaknesses in other areas. Financial covenants will still need to cover the whole railway system, to avoid project execution or railway operation suffering from cash-flow shortages.

xxvi. In later stages of lending to a given borrower, when it has developed satisfactory internal procedures in aspects such as investment planning and procurement, sector loans of the type developed in the 1970s for highways lending could be appropriate. Such loans, which might also cover several modes together, offer advantages in terms of greater flexibility, more even work-flow and better possibility of appropriate focus on broad transport policy issues.

xxvii. One of the most complex areas in need of better focus is locomotive availability. Bank and borrower efforts have nowhere yet succeeded in bringing sustained improvements from the low levels of availability which characterize so many borrowing railways. Most countries in Africa and many elsewhere show significant deterioration over the last 10-15 years. Low locomotive availability raises costs and has negative consequences on service reliability. A panoply of matters need attention—procurement arrangements and locomotive selection, staff training and discipline, workshop modernization and equipment, preventive maintenance procedures, workshop costing, spare parts financing, management of spares inventories, etc.

xxviii. Another area that needs increased focus, and depth of attention, in project preparation is railway management in the broadest sense, and particularly recruitment and training of managerial cadre. There is a basic antithesis between the flexible and active style of management required to transform railways into efficient competitive enterprises and the rigid and passive cast in which railwaymen have been moulded in Government administrations. The necessary change can only come about gradually and depends considerably on Government appointing to the railways the most experienced and imaginative leadership available. The pace of change can be expedited by recruitment of some senior managers from outside the railway, by special programs to recruit young potential managers and train them rapidly, and by organization of in-house training in management issues and techniques for senior- and middle-level staff. Also, management information systems need systematic review and, in most cases, upgrading.

xxix. A third area that should more frequently be focussed on in project preparation and design is the costing system. The Bank has given considerable attention to this subject, but costing is highly complex. Adequate systems, properly focussing on cost causation (as opposed to arbitrary cost-allocation) and integrated with the general budgeting and cost-control system, take years to develop. Improvements have to proceed in step with
increasing availability of trained economic and accounting staff, and with growing authority and capacity of railway management to make good use of the information. While better costing is useful for supporting tariff increase applications, it is more essential for other purposes: evaluating the railways' performance and identifying places where economies should be made; adjusting tariff structures to better reflect the comparative advantage of rail in particular types of service; deciding which traffics to encourage and which to discourage; and persuading the Government of the importance of giving the railway more freedom to become efficient.

xxx. A useful technique that the Bank has employed in its railways work to focus managerial attention on key issues, is Action Planning—consisting, at its best, of a short list of key operational targets, underlain by agreed and detailed programs of actions to be taken in order to reach the targets. The report reviews experience with this technique in some detail. Action plans are a major improvement on earlier exclusive dependence on overall financial performance measures, but difficult to use well. They need to be drawn up on the basis of the kind of detailed project preparation discussed above, and are essentially short-term instruments, of little value unless establishing targets at least for each of the next few years.

Realism

xxxi. Much railway planning has suffered from overoptimism and over-ambitiousness, as illustrated by the persistent tendency for projects to take much longer than expected to execute. But the most important area where more realism is required is traffic forecasting. Overoptimistic traffic forecasts have led to serious financial problems, as traffic revenues fell far short of expected levels. They have also led occasionally to investments of low return, and often to a failure to appreciate the seriousness of the railways' situation and the urgency of rationalization. They have substantially contributed to the poor public image and low morale of many railways.

xxxii. Yet there is no simple, certain answer to the problem. Railway traffic forecasting is inevitably difficult when many traffics are gradually moving away to other preferred modes, especially if this coincides, as recently, with a period of considerable year-to-year fluctuation in overall economic growth. Simple past trends in railway traffic or overall relationships between railway traffic and GNP can be very misleading. Rising prices of energy and containerization offer railways some important new marketing opportunities, but it should not be assumed that this traffic will turn to rail without a serious effort by the railway to improve service efficiency.

xxxiii. The most important means to improve traffic forecasts is to build up an effective marketing staff that is thoroughly knowledgeable about the various relevant markets for transport services, can advise railway management on the needs of clients and negotiates contracts with them. Appropriate commercial incentives need to be built in. Since traffic growth
is likely to result from efforts to adapt the railways' services to that segment of the market, the traffic forecasts most important for purposes of investment evaluation are those which the marketing staff should be best placed to provide.

xxxiv. An effective marketing function can only be built up slowly, and in the interim it may be best to organize on a periodic basis special commodity studies. It is important not to limit the work to the line-haul part of the movement. The approach needs rather to be that of modern 'physical distribution analysis', considering other legs, comparative service qualities of alternative modes and ancillary functions such as storage.

xxxv. There are also macroeconomic tests which can be applied to help avoid exaggerated forecasts. These should normally be the responsibility of a small central planning staff which would have ultimate responsibility for advising senior railway management on traffic forecasts. This group would be knowledgeable about overall transport intensities, general national and regional economic prospects, the foreign market outlook, trends in diversion to other modes, evolution regarding lengths of haul by rail and road for different commodity groups, income- and price-elasticities of passenger demand, etc.

xxxvi. The Bank role in traffic forecasting should be primarily to help build up these institutional arrangements and to advise on the analyses. In view of the uncertainties inevitably surrounding railway traffic forecasts the Bank should encourage borrowers to carry out "sensitivity analysis" on the implications for the railways' financial performance and projects' economic returns of deviations. Such sensitivity analysis can be a useful basis for discussion with the railway and its Government of what contingency measures should be envisaged in the event that shortfalls do occur.

xxxvii. Greater realism is also needed in other aspects of financial forecasts. In particular, on the cost side, more attention has to be given to understanding the dynamics of the railways' wage rates. Caution is also needed on the pace at which cost savings are projected to materialize from implementation of the Action Plan and of programs for closure of uneconomic services, etc. On the revenue side, attention needs to be given to procedures for adjusting tariffs in light of cost increases, and allowance made for the lag between occurrence of cost increases and application of tariff increases.

Conclusion

xxxviii. If the approaches described in the preceding pages are to be carried through successfully the Bank's Regional railways staff will need more support. As much as possible of the more detailed preparation and planning work should be done by staff of borrowers and their Governments and by consultants hired by them. Increased use should be made in the railways field of the Bank's Project Preparation Facility and of loan-provisions for financing local or foreign consultants to help with project preparation. Nonetheless, assistance to any given railway is likely to require more Bank staff time than in the past to provide sufficient advice and guidance on the work to be done, and to win conviction from Government and railway officials.
Many borrowing countries are increasingly concerned about their railways because of the heavy load that subsidies are imposing on national budgets and because of the increased importance that energy shortages and price increases have given to railway efficiency. The structural transformation required in railways is a long-term job, and a single loan is likely to be comparatively costly to the Bank in terms of staff requirements relative to the benefits to the borrower from Bank involvement. Therefore significant Bank staff expenditures would normally be needed for many years. These staff expenditures must be backed with Regional management support to convince Governments of the importance of railway reform and to argue for crucial actions as the need arises.

In order to ensure that the Bank can make an effective contribution, it is necessary to have a set of minimum criteria for acceptability of a railway project for Bank financing. These may be summarized:

(i) Clear and well-defined economic role for the railway, reflected in carefully prepared and realistic traffic forecasts;

(ii) Agreement with Government that the basic objective is a commercial operation of the railway, in active competition with other modes of transport;

(iii) A start on any required Governmental actions for (a) improving the functioning of the transport market (e.g., reduced regulation, and more appropriate taxation, of competing modes), (b) permitting closure of uneconomic lines and services, and (c) increasing freedom of railway management;

(iv) A start on any required Railway action on internal reforms needed in respect of management, planning, marketing, costing;

(v) Adequate definition of the Railways' Investment Plan and absence of any significant uneconomic investments;

(vi) Availability of substantially completed engineering designs and adequately prepared operational Action Plans covering key problem areas selected for near-term action.

Governments and railway enterprises that are prepared to meet these criteria should receive the stronger technical support from the Bank recommended in this paper. The benefits in terms of more effective transport, lower costs of meeting overall transport requirements and reduced financial burdens on general Government revenues would fully repay the combined efforts.
I. Introduction

1.01 Railways continue to be one of the most important means of overland transport. They normally account for between 10 and 60% of all inland freight movements and up to 50% of passenger movements. Yet the railways have been a steadily growing cause of concern in almost all countries, developing and industrialized alike. This concern often relates most directly to the growing amounts of financial assistance that most railways have been requiring from their Governments. Traffic revenues have been increasingly insufficient to cover the cost of operations.

1.02 Underlying the financial problem has been the difficulty that railways, in many ways the oldest modern form of transport, have had in adjusting to change and development. Railway networks, operated twenty-four hours a day over a wide area, are necessarily complex and hard to manage. The railway enterprises' agility has been further restricted and hampered by socio-political factors—such as traditions stemming from the time when railways were the only modern form of transport, popular resistance to reductions in the level of service or to increases in prices, and the strength of railway labor unions and of railway lobbies more generally.

1.03 Governments have reacted to this situation in various ways. Some rich Governments have been prepared to offer rapidly increasing subsidies which in several industrialized countries now run into the billions of dollars each year. Some Governments have sought to restrict the development of alternative modes and enacted legislation to protect the railways. Most Governments, particularly in the developing countries, have not been able to meet the full extent of the financial shortfalls. The resulting tight financial situation has contributed to the vicious cycle of railway decline in which the lack of funds results in the deferral of maintenance and renewals. This in turn leads to a deteriorating service and prevents the railway from dealing efficiently even with those traffics for which it is best suited. In some countries, mainly in Africa and Asia, the railways have even been unable to carry the more restricted share of total traffic now offered them and have been a highly visible physical bottleneck to development.

1.04 With or without subsidies or protective legislation, the fundamental problem remains the same: the role of railways in the total transport picture is steadily changing, and restrictions on the development of other modes normally do no more than slow the pace of change. Whereas the railway networks, and their supporting facilities, were originally laid out to provide general transport services, there has been a trend for the traffic offered to the railways to be increasingly concentrated in large-scale movements and movements along certain main routes. The newer modes of transport, such as road services and pipelines, can offer cheaper and/or more reliable and speedier service for much other traffic. Standards of service expected by transport customers steadily increase with general economic development, but railways' own internal costs also increase, as wages reflect productivity increases in the rest of the economy.
The Bank's Involvement

1.05 The World Bank has been a major financier of railways. Railways lending through June 30, 1981 amounts to a cumulative total of nearly $5,500 million, 30% of accumulated lending for transport projects and 6% of total Bank/IDA lending. The share of railway lending has declined from some 35% of accumulated transport lending through FY1963 to 26% for the five-year period FY1969-73 and 22% for the five-year period FY1977-81. Measured in terms of total costs of projects supported by the Bank, railway projects are considerably more important because they are typically larger and carry more co-financing than projects in other modes; for instance, in the latest five-year period, they accounted for 36% of the total investment supported through Bank/IDA transport projects.

1.06 The Bank has also been involved in its member countries' railway development in various other ways. A few loans for agricultural projects have included provisions for railway investments such as purchase of specialized wagons or realignment of a line affected by construction of a dam and reservoir. Various mining projects supported by the Bank have involved construction of dedicated railway facilities, and this may be expected to occur more as the Bank increases its lending for exploitation of coal resources. Loan agreements for highway projects have on several occasions included conditions restricting investment in railways or requiring closure of certain lines. More generally, Government policies toward railways and railway investment have often been an important subject in the Bank's discussions with its borrowing countries on transport policy and may be more so in the context of efforts to find efficient ways of saving energy. Insofar as railways often account for one of the largest subsidies paid out of general Government revenues, they may also be expected to be a special focus of attention in some of the Bank's new Structural Adjustment loans.

1.07 The Bank's main attempt to deal with the multi-layered railway problem has, however, been through loans specifically devoted to railway projects. The $5,500 million mentioned has been spread among some 42 different railway systems. Eight of the systems are in countries to which the Bank is no longer lending. Another nine are in countries which are still borrowing for other purposes, but where the Government or the Bank have decided that Bank involvement can currently be more useful in other fields. Thus, since the mid-1970s the Bank has had about 25 active railway borrowers, the three or four 'drop-outs' in this period being replaced by countries which newly began to receive Bank support for their railways. Less than half the 'active' countries have been borrowing from the Bank for railways for more than a decade. About five railway loans have been made each year since the middle 1970s, and the Bank's country-based lending programs presently indicate a continuation of the same pattern in the coming years.

1/ All references to the Bank in this document apply equally to the International Development Association.
1.08 The Bank's general objective in railway lending has been to help the railways break the vicious cycle of decline by transforming them to efficiently run enterprises. In the early 1960s the Bank relied mainly on hardware solutions to accomplish that objective. The main problem was identified as being one of obsolete equipment and infrastructure, and therefore the solution was equipment renewal, one important component of which was the replacement of steam by diesel locomotives. Since that time there has been a gradual broadening and deepening of the Bank's approach, to attempt a more comprehensive look at the constraints affecting the railway, include a more balanced set of interacting project components and emphasize complementary actions by the railway in fields such as planning, costing, line and service closures, workshop organization, rolling stock maintenance, staff reductions, training, traffic organization, train scheduling and composition, and marketing.

1.09 The large majority of projects assisted consist essentially of a two/three-year time-slice of the railways' overall investment plan. They therefore include many sub-projects in renewal and upgrading of track and bridges, construction and equipment of maintenance depots and shops, acquisition of motive power and rolling stock, modernization of signalling and telecommunication facilities, and construction and improvement of yards and terminals. The Bank makes an assessment of the overall investment program in the context of the expected role of the railway in the economy, and analyzes individually the economic validity of the particular sub-projects to be assisted by the Bank and co-donors. Supplementary letters to the Loan Agreement, and other supporting documents, detail the targets and plans for improvement of operating efficiency agreed between the railway and the Bank, and provisions are often included in the Bank loan to cover related technical assistance, studies and training. A few Bank railway projects, instead of incorporating a large number of sub-projects, focus instead on one or two particular major investments such as building a new line, construction of a mineral evacuation line and procurement of necessary rolling stock and motive power, establishment of major new workshop/manufacturing facilities, or execution of a large electrification program.

The Major Issues

1.10 Although loans for railways require on average about 50% more Bank staff time than those for other transport modes, they have also had a much more mixed pattern of success. Thus the Bank's railway problem is in terms of persistent shortfalls in most of its projects from their stated objectives. Financial performance is the area where the shortfalls have been most obvious. Only in very few cases and in some particular years have the financial targets been met, and even the reduced targets agreed in follow-on projects have not been generally achieved. Operational efficiency improvements and structural changes in the railways have been slower than expected. Traffic growth has usually been below appraisal forecasts. According to the ex-post evaluations done to date, railway project economic returns are generally above 10% but often short of appraisal expectations.
In some cases the Bank has had very little success in helping Government and railway planning authorities to adopt a more selective approach to new investment; for instance, after a loan had been made, major new line construction or large-scale equipment acquisition has sometimes been embarked upon without feasibility studies having demonstrated their economic viability, and this has been a major factor in causing some railways to drop from the group assisted by the Bank.

1.11 In view of the high administrative expense and apparently limited success of Bank operations in the railway mode, it is appropriate to pose the fundamental question of whether the forty staff-years presently devoted to these operations each year should not be diverted to other purposes. More detailed questions arise as to the policies and practices followed by the Bank in the railways field. Has the Bank been too optimistic on traffic and equipment performance, or over-ambitious on efficiency improvement and structural change, or over-demanding with regard to financial performance, or too conservative on the potentials for new lines? Should subsidies be more readily accepted to keep traffic off the roads? Has the Bank been too hard in encouraging closures of allegedly uneconomic lines? Is the Bank underestimating the energy arguments for rail transport? Is there scope for redirecting staff efforts on railways more effectively?

1.12 This paper attempts to deal with these questions in light of the Bank's own lending experience and the broader experience of railways in modern times, taking account of the socio-political difficulties of rapid railway adaptation. It is based mainly on detailed analysis of experience under one or more loans (for which project performance audits have been prepared) to about half the Bank's currently active railway borrowers and several of those no longer active, discussions with a few of the Bank's borrowers, various studies commissioned by the Bank on specific topics over the last few years, and review of other material available on railway problems and issues in both developing and industrialized countries.

1.13 Reversing the order of the problems mentioned at the outset, to start with the most fundamental, the paper proceeds in three main chapters:

The Traffic Problem: After reviewing Bank experience with railway traffic forecasts and the reasons for, and significance of, deviations, this chapter seeks to identify the main determinants of the role that railways can economically play in transport and to suggest measures for improving forecasts.

The Efficiency Problem: The focus of this chapter is on the changes needed to enable the railways to fulfil their potential economic role, the difficulties and successes experienced in bringing them about, and the areas that seem to merit special attention by the railways and their Governments in the future.

The Financial Problem: The purpose of this chapter is to review experience and principles with a view to identifying financial objectives and practices that can be most supportive to railway management in seeking to achieve railways' potential economic role.
These chapters are backed by annexes elaborating the arguments in greater detail and illustrating them with more examples. A further chapter in the main text is devoted to drawing up a general balance sheet on Bank work with railways to date and identifying the broad lessons as to how to make it more effective in future. The final chapter reviews the need for further Bank assistance to railways and the forms such assistance should take.

II. The Traffic Problem

2.01 Traffic forecasts are essential for planning railway development and investments. Bank-assisted railway projects have generally been based on forecasts prepared by borrowers or their consultants, but evaluated and sometimes modified by the Bank, for at least five years into the future.

The Record of Appraisal Forecasts

2.02 The large majority of Bank-assisted railway projects, both completed and on-going, have been based on freight traffic forecasts which proved overoptimistic. Overall traffic shortfalls have usually exceeded ten percent by the second or third year after appraisal and have reached 30-40% in a few cases. Actual growth of rail freight traffic (measured in terms of ton-kms) has differed widely among countries, ranging for instance from a maximum of 8% p.a. in the Cameroon to negative growth in Egypt, for the period 1965-76. A large sample of Bank railway borrowers shows half with traffic growth above 3% p.a. over this period and half with traffic growth below 3%; the different continents are equally represented in both groups, except for Latin America with most borrowers in the higher-growth group.

2.03 Passenger traffic growth has exceeded the forecasts in nearly three-quarters of projects both completed and ongoing, with the deviations generally lower than in the case of freight but still exceeding 10% in some years of the forecast for about half of them. Actual traffic has been consistently below forecast in only two or three cases. Using the same period as applied to freight (1965-76), actual passenger traffic has shown steady growth except in six countries where it has either stagnated or declined, and most of the countries tend to conform to marked Regional patterns: 6-7% annual growth in East Asia, 4-6% in Africa, 2-4% in South Asia, 2-3% in EMENA and stagnation or decline in Latin America.

2.04 The freight traffic shortfalls can generally be related to a combination of two or more of the following factors: (a) slower than expected growth of the overall national economy or of particular productive sectors, (b) incorrect assumptions, based on too static a view of the recent past, about growth sectors' inland transport requirements per ton of output or input, (c) insufficient allowance for competition from other rising transport modes, such as roads, pipelines or coastal shipping, and (d) poor or deteriorating operating efficiency on the part of the railway, extending in several extreme cases to sheer physical inability to carry the traffic on offer. The factors interact with one another: for example, deteriorating operating efficiency and quality of railway service would tend to increase the attractions of alternative modes.
2.05 The greater than expected rise of rail passenger traffic appears to have reflected mainly insufficient allowance in the forecasts used at appraisal for growing population and high income-elasticity of demand for travel, and greater than expected traffic-attracting effects of improved long-distance passenger services when introduced. A simple regression analysis relating rail passenger kilometers to average revenue per passenger kilometer and gross domestic product, both in constant prices, suggests that the explanatory power of these two variables is very high and that GDP elasticity was significantly higher than price elasticity. The latter finding implies that, even with rising real prices of rail services, passenger traffic would increase.

2.06 A few particular phenomena, largely peculiar to individual regions, are worth noting. In a few cases, mainly in Asia, the greater than expected growth of passenger traffic was the other side of the coin of the freight traffic shortfall, higher operational priority being assigned to passenger services within overall line or locomotive capacities more constrained than expected due to inefficiencies. Physical inability to carry freight traffic offered, largely independent of freight/passenger priority issues, has been mainly a characteristic of some of the African railways. Another particular problem of certain African railways has been very great shortfalls and long delays in the exploitation of natural resources which were to provide important traffic, due sometimes to domestic constraints, and sometimes to world market problems. In several Latin American cases greater than expected rail passenger traffic reflected not so much an historical increase as the considerable social and political difficulties of carrying through planned reductions of unremunerative passenger services. Unexpected diversion of traffic to other modes has been most acutely a problem in the more advanced borrowing countries, with better highway networks, but it has very much begun in others and, in face of poor railway performance, has occurred there even when the road route was poor and much longer.

Consequences of Forecast Errors

2.07 The range of evidence available from performance audits of projects completed to date suggests that the effects of traffic shortfalls on economic rates of return are generally less dramatic than might be expected. Various attenuating features come into play. Delays in project execution (sometimes appropriately deliberate in the case of rolling stock acquisition) mean that the new facilities come on stream later when traffic may have partly caught up. Shortfalls in operational efficiency often mean that more equipment is needed to carry any given amount of traffic. Particular parts of the traffic are often growing much faster than the total, and some of the project investments (e.g., in special wagons or on particular routes) are often precisely for them. And many Bank railway projects include large components of overdue replacement and deferred maintenance, meaning that substantial

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2/ Covering the thirteen borrowers, distributed among all continents, for which sufficient data were available from the mid-1960s to the mid-1970s.
reductions in operating costs may be enjoyed even without additional traffic. Thus economic rates of return on relevant components may occasionally reach only a half or a third of expected level, but they appear seldom to have fallen below about 10%.

2.08 The more serious visible consequence of traffic shortfalls is on financial performance, which will in turn have significant consequences on project execution and system maintenance in cases where a substantial proportion of the investment program financing was expected to be internally generated or where Governments have difficulty in providing additional support on a timely basis. This has been a very major problem in a number of Bank-assisted projects.

2.09 The most serious consequence of the typical traffic overestimation is probably more subtle and long-term in nature. At first, the unwarrantedly rosy prospects painted mask the seriousness of many railways' situations and obscure the urgency of major adaptations needed to cut costs and attract traffic. Later, when the rosy prospects are proved false, a general sense of depression, exacerbated by financial shortages or operating losses, lowers morale in the railway, gives a bad public image, encourages good staff to pull out and discourages bright younger people from thinking of the railway as a promising important career.

Changing Role of Railways

2.10 Accurate forecasting of railway traffic has been particularly difficult in the last thirty years because the railway has been becoming a more specialized and limited-purpose mode of transport, due to technological and infrastructural development in other modes and change in the structures of countries' economies and economic geographies. The railways have been squeezed between the increasing claims of pipelines, coastal shipping and air services for long hauls and of road transport for shorter hauls, and between the declining importance of heavy bulk movements in some developed countries and the increasing dispersion of agricultural and manufacturing production in some developing countries. Review of the experience of a wide range of countries, both developed and developing, following widely different policies in the organization and regulation of the various modes of transport, shows a common pattern, of substantial, and generally greater than expected, reduction of the railway's share of total traffic.

2.11 The comparative advantage of railways is nowadays to carry dense flows of reasonably homogeneous traffics over fairly long distances, whether passengers or freight. The less dense and homogeneous the traffic, the longer the distance needs to be, and vice versa. Thus multiple trainloads of commuter passengers or of coal may be carried quite competitively over distances of only 20 or 30 kilometers. On the other hand, wagonloads of passengers or general freight, involving lightly loaded trains or much handling or marshalling activity, may be very uneconomical even over a thousand kilometers.
2.12 The basic determinants of railway traffic in a country are thus three: economic structure (the types and quantities of commodities and services produced and consumed), economic geography (distances and degree of concentration of points of origin and destination) and transport technology (especially the degree of adaptation of the railway network and technology -- and of the manner in which they are operated -- to the traffics available, and the level of development of other modes of transport).

2.13 Basic raw materials such as coal and mineral ores loom large in the operation of the majority of railway systems; coal alone accounts for 30% or more of many national networks' total traffic. In movements of these goods railways have generally been able to hold their own against other modes, or even to increase their share. Nonetheless these commodities have presented serious forecasting problems, connected, for instance, with difficulties in increasing mine production or changes in the location of processing plants.

2.14 A large category of traffic where railways generally have a far more limited long-term role is general agricultural and manufactured products. Economic development tends to mean increasing local and regional production of these goods and/or increasing differentiation among particular styles or modes of product. The first trend makes for shorter hauls, and the second for smaller consignments, both tendencies favoring flexible, rapid, door-to-door truck service, with its lesser packaging and lower inventory requirements. Railways' share in these traffics can be expected to be more and more confined to large consignments, for instance for export/import movement to and from ports or in trainloads for onward movement beyond a land frontier.

2.15 Between these two categories of freight traffic in which railways have respectively a major and a limited role lies a broad middle ground, largely consisting of intermediate goods like cement, fertilizer, edible oils, food-grains, bulk chemicals, bulk steel goods, oil products, and automobile parts. Rail's share of these can be important, depending mainly on the extent to which the volumes and patterns of production and trade give rise to large concentrated flows and on the degree of adaptation of railway service, infrastructure and wagons to the particular requirements of the trade.

2.16 As regards passenger traffic, the key factor for rail is again the density of the flows. Railways can no longer successfully compete with buses, cars and aeroplanes for thin flows. Rapidly increasing concentration of population in urban centers in developing countries and strong evidence of a high propensity to increase travel as incomes rise indicate that increasingly large suburban and inter-urban passenger flows are to be expected. On routes where this traffic is sufficiently dense to warrant improvement in the regularity, reliability and speed of rail services, rail can be expected to have a growing place, at the same time as its share of overall passenger movements is stagnant or declining.

Railways and Energy Issues

2.17 The railways to which the Bank has lent have not generally benefitted so far from any major shift of traffic toward them as a result of
the energy problems which began in 1973. One possible exception is the Sao Paulo State Railways in Brazil, which enjoyed overall freight traffic increases of 32% in 1979 and 25% in 1980, partly as a result of efforts to compete more aggressively with truck services when retail prices for diesel fuel rose significantly. For most, however, if there has been any additional traffic, it has rather been in the form of coal as a result of increased production. These railways' share of total national traffic, like that of industrialized countries' railways, has generally continued to fall.

2.18 Much has been written over the last years about the greater fuel efficiency of railways as compared with other modes, almost to imply that substantial additional traffic should therefore fall into the railways' hands or even be allocated to them by Government edict. For instance, the point is often made that trains are about three or four times as energy-efficient as trucks for freight movement, and at least two or three times as energy-efficient as cars for passenger movements. Such figures normally result from a straightforward comparison between the average fuel efficiency of existing inter-urban operations. They therefore reflect the very different transport jobs which each mode is fulfilling and do not say much about the relative fuel efficiency of the various modes in carrying out the same transport task.

2.19 Fuel efficiencies, in railway as in road transport operations, vary enormously depending on factors such as circuitry, empty backhauls, access costs, speed, route conditions and gradients, equipment used, and, most particularly, load factors. Trains presently run range in fuel efficiency from 0.8 kec/ per 100 traffic units, alike for freight and for passengers where conditions are highly suited to rail transport and the operation is very efficiently run, to 20 or more kec per 100 traffic units on some uneconomic services which should be closed; the latter is far in excess of what road transport would normally require, except for single-occupancy cars in very congested urban conditions. To be useful for practical purposes, rail/road comparisons have to be specific, taking account of the volume of people or goods to be moved, frequency required, nature and condition of route, etc.; and they need to allow for the technological and operational improvements in all modes involved that may result from introduction of imported technology and the continuing pressure of higher fuel prices.

2.20 Evidence is beginning to accumulate, however, that the relative rise in the price of energy can significantly increase railways' marketing opportunities, if the railways will act to take advantage of them. The most significant initial effect may actually be in slightly improving railways' competitive position vis-a-vis waterways and some coastal/ocean shipping, where the latter's advantage of lower fuel costs per ton-kilometer is offset by the more round-about routing required.

2.21 As regards competition with road freight transport, energy price trends are enhancing rail's potential for attracting traffic in containers

3/ kec means kilograms of coal equivalent. The phrase 'traffic units' as used in the text above, means interchangeably ton-kilometers or passener-kilometers or the simple sum of both.
and trailers, which have been a particularly fast-growing part of many European railways' freight traffic in recent years and are getting increasing attention from US railways. Medium-haul trailer traffic is one of the few publicized cases where a detailed and specific study of comparative energy efficiency under normal commercial operating conditions has been done. Within about six months of starting a more efficient rail service, better adapted to shipper needs, on an important 650 km route, the Milwaukee Railroad in the U.S. was able to attract a significant share of total trailer traffic on the route (perhaps 20-25%), with door-to-door fuel expenditure per trailer about half that of the comparator trucking company on the same route.

2.22 As regards passengers, energy trends may also reinforce rail's comparative advantage vis-a-vis road on very densely travelled suburban routes, and vis-a-vis road and air on major inter-urban routes up to about 500 km length. Specifics of terrain, speed, etc., and especially load factor, again have to be examined for each case. The Bank is now supporting suburban surface rail improvement projects in Seoul and in one city in Brazil which are expected to offer useful minor fuel savings. As regards inter-urban services, Korean National Railways have brought the fuel efficiency of their highest-grade service on the Seoul-Pusan run to about 0.8 kec/100 passenger-kilometers, whereas buses on the same route are said to reach about 1.4 kec/100 passenger-kilometers, assuming the 95-100% load factors that are realistic for each in Korean circumstances.

2.23 Rail electrification may result in substantial savings in the cost of energy needed for train operations, depending on the cost of generating electricity in new power stations (since electric traction would constitute a new load on the electric power system) and on the values, in alternative uses, of electric power compared with petroleum. Electrification also increases operational efficiency, mainly because electric locomotives are easier to maintain than diesels, and may increase track utilization and productivity of train staff. However, it involves large capital expenditures, not only for the construction of the electric contact line and railway substations, but, depending on project circumstances, for the construction of high voltage lines linking the substations to the electrical power network, for the protection of signalling and telecommunications equipment (both the railways' and other users'), and the provision of high-voltage clearances in tunnels and elsewhere. As a result, electrification remains normally justifiable only at high traffic densities, of the order of 10 million gross tons (4 million net tons) p.a. It is sometimes argued that railway electrification decreases national oil dependence; however, this effect is small, since the railways account, typically, for only 2-3% of national oil consumption. Much more extensive measures than railway electrification would be needed to cushion the economy against a disruption of oil supplies; however, the reduction of a strategic oil reserve resulting from electrification could be taken into account. Some

140,000 km, or about 12%, of the world's railway track are now electrified and, while this is likely to increase significantly, both the costs and the benefits of electrification can vary considerably depending on project circumstances, so that any commitment needs to be preceded by very thorough economic analysis of both comparative transport and alternative energy costs for the particular situation.

2.24 Thus energy considerations call for both a cautious and an aggressive response from railways and Governments. The caution needs to be maintained against any superficial assumptions that traffic will automatically return to railways as fuel prices rise, without railway efforts to attract the traffic. Energy is still only one factor in total costs of transport, and its significance is greatly diminished for many of the shippers who might possibly shift from road to rail by the fact that haulage costs are only about half their distribution costs, and the extra inventories that they would have to carry to make good use of rail service may well have costs outweighing haulage savings.

2.25 The aggression needs to be channelled into: measures to improve the railways' own energy efficiency; a redoubled effort at improvement of the other dimensions of efficiency, so as to eliminate services that have become even more uneconomic and to enable rail to concentrate on capturing the full potential traffic which it can handle more efficiently than other modes; and active identification, development and marketing of services which energy price trends bring within railways' range of competitiveness. Governments can also do much to put this effort in the right direction, and to support it, by improving road taxation structures, as discussed in Chapter IV.

Future Role of Rail

2.26 Little activity can be foreseen for the construction of major new railway lines except in the form of extensions to existing networks to meet major mineral, industrial or natural resource traffic potential. The traffic required to make a new line economically viable nowadays is so great — at least one million net tons, normally — that actual building is likely to be limited. New high-speed passenger lines, such as are being built in a few parts of Europe and Japan, need extremely high traffic potential, only likely in areas of both high income and very high population density.

2.27 On the other hand there are countries, especially smaller ones, and extensive regions of larger ones, where railways that already exist should in fact be closed or converted to roads. Transport technologies and needs have changed so much over time that the mere fact of a railway's existence today provides little or no indication that it should exist tomorrow; the case for maintaining it has to be based on an objective examination of future traffic prospects, taking account of the general trends discussed above. Moreover, such examination has to include an explicit judgment as to the overall level of efficiency and service quality that the railway may be able to attain, which will determine the share of traffic it can ultimately attract. The very great scarcity in many countries of managerial talent capable of coping effectively with the extraordinarily complex problems of a nationwide network like a railway recommends a close look at the alternative of concentrating as much traffic as possible on other transport modes where the managerial tasks can be broken up into many smaller parts, more compatible with normal human capacities. The Bank has played a part in many railway line closures and
related studies, and has sometimes succeeded in convincing countries not to make planned investments in railways that had no future. Failure to adjust the size of a network to the economy's requirements can lead to the need eventually to close even what might otherwise have been retained.

2.28 Many existing lines, however, do have significant traffic potential, which can be realized by means of better exploitation, and with the aid of supplementary investments smaller than those required for major new line building. As basic industries are built up in developing countries, they generate an increasing demand for railway transport for inputs such as iron ore, limestone and coal and for semi-manufactured goods and other outputs. Expansion of primary producing activities, especially mining but also regionally concentrated agricultural production, also often gives rise to large railway transport demands. Growing integration of the developing countries into the world economy means expanded international trade flows, often suitable in their overland portion for railway carriage. Urbanization, and particularly concentration of people in larger urban centers, increase the potential for interurban, and in the largest cities suburban, rail passenger services. To date the most notable success among Bank borrowers in new traffic development has in fact been in respect of inter-city passengers on selected major routes. The railways of Ivory Coast/Upper Volta, Republic of Korea, Malaysia, Spain and Taiwan have all succeeded in stimulating sustained inter-city traffic growth over quite prolonged periods by upgrading passenger services. The Seoul-Pusan route in Korea is a notable example; railway traffic rose from 540,000 passengers in 1971 to 4 million in 1978.

2.29 Several borrowing railways have had considerable success in the development of traffic in containers, which generally carry goods in the highly competitive categories of general agricultural and manufactured products. Malaysia, Mexico and Spain are among notable examples. Much of this traffic is normally international trade, and key factors in fostering it are effective coordination between port and railway authorities in providing and operating the facilities for direct off-loading from ships to railway cars of containers requiring significant onward movement (or vice versa in the case of exports) and effective arrangements for pick-up and delivery from and to inland origins/destinations.

2.30 Another illustrative area in which modern rail technology can help to build traffic is the application of unit trains, sometimes of special-purpose cars, running between dedicated sidings, for carriage of bulk traffics in intermediate goods. There has been particularly strong development in these directions in India, Korea and Mexico among the Bank's railway borrowers. Rearrangement of customers' distribution systems and inventory locations can sometimes result in flows of traffic that are sufficiently dense for railways' share to be significantly increased.

Improving Forecasting

2.31 Probably the most important step that could be taken in most developing country railways for useful strengthening of forecasting would be to develop stronger customer relations/marketing functions and to link the traffic forecasting responsibility very closely with those functions. Marketing represents a reaffirmation, in an era when railways as well as other modes have more alternatives to offer, of the importance of serving the public by adapting and adjusting the service to their needs. Closer contact
with the main customers, better understanding of the factors affecting their transport requirements and greater appreciation of the failings they find in railway service and the advantages they see in alternative modes would certainly have helped to avoid some of the more significant errors in past railway traffic forecasts.

2.32 In the best modernized railways the marketing organization is charged with identifying marketable customer services, selling them and achieving agreed revenue targets. Customer research, product design (including aspects such as pick-up and delivery, frequency, reliability, unit and block trains, long-term contracts, etc.) and pricing are all integral parts of the marketing department which also monitors services and demands adherence to service standards by operating departments. Arrangements of this sort, with marketing staff assigned to become fully familiar with client needs and relevant railway operations, to prepare and negotiate contracts with them, and to supervise execution of the contracts and sort out day-to-day problems, have worked well in Mali, for example, for certain major traffics.

2.33 During the necessarily gradual build-up of such a modern marketing organization, it would be reasonable for the customer relations/traffic forecasting staff to carry out studies, perhaps on a five-year cycle (with briefer interim updatings where needed), covering the prospects for all principal commodity groups with potential for railway carriage. The analysis would never be solely of the line-haul part of the movements required -- a limitation that has underlain much past failure to appreciate the competitive threat of other modes -- but would take a distribution-system perspective considering the roles of the various transport modes and of transport-related services such as storage. The Bank has begun to promote commodity studies of these sorts in recent years, but they are not yet sufficiently seen by railway managements as part of their responsibility; a permanent capacity should be built up within the railway enterprise. This same market research group, again with the help of consultants as necessary, should also undertake periodic passenger studies, focussing particularly on the densely travelled routes, whether suburban or inter-city.

2.34 Marketing staff can still of course be over-optimistic. Some railways have indeed suffered from customers exaggerating their prospective requirements in order to be sure of having available all the capacity that they might need. These tendencies can be reduced by writing contracts in such a way that large customers will bear the costs of their exaggeration and by giving the marketing staff specific revenue targets to achieve, as proposed above; they will then have incentive to investigate and discount their own or their customers' expectations appropriately. Traffic forecasts prepared by operating departments also frequently contain exaggerations since there the natural tendency is to make projections which will justify generous operating budgets. It may be useful therefore to place ultimate responsibility for advising senior management on traffic forecasts, especially of a longer-term nature, with a small central planning staff that will be as neutral as possible and act as a professional critic. Such a group will clearly be in touch with the Government agency responsible for any national development plan but it should be more than a mere mouthpiece for such plans which have so often contributed to excessively optimistic railway traffic forecasts.
Bank Action

2.35 During preparation and appraisal of investment projects for Bank financing, the Bank should divide its efforts with regard to traffic forecasting between two principal dimensions: (a) advising and assisting the execution of commodity and route studies directly related to the main investment items planned to be included in the forthcoming project, and evaluating the outcome of such studies, and (b) developing the necessary understanding and data—largely of macro-economic nature, such as overall transport intensities, general economic prospects, the foreign market outlook, trends in diversion to other modes, evolution regarding lengths of haul by rail and road for different commodity groups—to enable broad verification and assessment of the overall traffic forecast produced by the railway. The Bank’s effort should have an important institution-building dimension, helping to build up and strengthen the marketing and planning functions discussed above.

2.36 In view of the difficulties of accurate railway traffic forecasting and the tendency to systematic upward bias, there is clearly much to be said for the practice, recently developed in appraisal of railway projects, of carrying out "sensitivity analysis" on the implications of alternative traffic forecasts for the railways' financial performance and projects' economic returns. Sometimes a good case can be made for basing the capacity plan on a 'best-estimate' traffic forecast, erring slightly on the optimistic side, and the financing plan on a somewhat pessimistic view of traffic prospects.

2.37 Finally, to address the crucial and often difficult issue of the long-run role of a railway, especially in cases where the broad assessment of the traffic forecast, comparison with other countries or developments in other modes raise doubts as to whether the railway is moving in the right direction, it may be worthwhile to organize major studies looking 10 or 20 years ahead. To get away from the pervasive influence of trend analysis, the approach may be taken of first considering alternative possible regional and sectoral economic development patterns and energy scenarios, identifying the main resultant transport requirements in ten/twenty years' time, and sketch-planning optimal transport networks to meet such requirements.

III. The Efficiency Problem

3.01 Achievement of the vital role that railways can have in modern economic development depends not only on potential demands for their services but also on the efficiency of the railways' response to these demands, in terms of the cost and adequacy of service levels offered. The changes that have taken place in rail services' technology and market, combined with the lags that tend to accumulate in adapting to them, mean that the adjustments required in many dimensions of many railways are structural in nature; investment in new physical facilities or equipment is only one of the
ingredients. The principal purpose of Bank railway lending is to assist railway managements in the huge task of adapting quality and quantity of services to country needs and bringing about the necessary structural changes. The mechanisms of assistance have themselves been adjusted over time in light of experience. Yet improvement has generally been slower than planned and backslidings have been frequent. The necessary changes are so difficult and complex that it is only to be expected that they will take time to accomplish, but without them railways can become serious bottlenecks to development, as has been happening in some countries, especially in Africa.

3.02 The purpose of this chapter is to draw conclusions from the Bank’s experience in efforts to help improve railway efficiency. First, it deals with the main resources at the disposal of the railway — their management and their staff — and the "Action Plan" mechanism developed by the Bank for assisting and promoting efficiency improvement. It goes on to analyze problems that have arisen in the five main technical dimensions of railway activities where change is most crucial and where most Bank assistance has been directed: motive power improvement, workshop rationalization, line and service closures, track maintenance and upgrading, and train operations. A final section summarizes overall conclusions.

3.03 While such a subdivision of the efficiency problem is obviously necessary for purposes of exposition, any such breakdown runs the risk of missing the most outstanding characteristic of railway operations and problems: their interrelatedness, and hence the organizational discipline needed to deal with them. Railways are systems, and generally very large and complex systems compared to others in a country. Their comparative advantage, even as a more specialized mode of transport than in the past, lies partly in their ability to combine different traffics on the same physical facilities. Ways have been found to bring external market discipline usefully into play — for example, by contracting out particular sub-activities such as maintenance of rolling stock, execution of some track works, provision of special-purpose cars and even whole trains (by shippers themselves or leasing companies), and operation of subsidiary or single-purpose lines — and possibilities for more use of these solutions are always worth consideration. Nonetheless, the main body of railway operations in a region or a country has to be run by a single integrated organization. Here too, market forces, in the form of appropriately structured incentives to individuals and to component parts of the organization, can of course be used but hierarchical discipline is also crucial, equally in the day-to-day management of staff, as in the longer-term management of change and improvement. It is a matter not only of strict selection and pursuit of priorities, but even more of disciplined balancing and adjustment of priorities in light of progress and problems. Otherwise the beneficial effects of change and improvement in one area are very soon nullified by bottlenecks in another area.

Management

3.04 Exceptional imagination and agility are required of railway management. Yet railway managers have typically been schooled in bureaucratic railway administrations hemmed in on every side by Government.
This basic antithesis, between the flexible and active style of management required and the rigid and passive cast in which railwaymen have been moulded, is reflected in almost every subject treated in this report. Thus management philosophy and outlook are frequently one of the areas most in need of structural change. Practically all of the Bank Group borrowers are nationalized entities. In a few cases, due to senior management appointments being politically based or for excessively short periods, railways have suffered from a virtual vacuum of experienced leadership. More often the problem is a management philosophy inimical to adjustment of operations, based on the older "public service" ideal for railways. The possibility of being forced out of business, which is so real for most road transport operators, is inconceivable to most railwaymen. In many countries, developed as well as developing, railways are periodically subjected to arbitrary political interventions, for instance requiring provision of additional services on particular lines or at particular stations. In almost all countries Government restraints on changes in costs (mainly labor), tariffs and network structure are such that Presidents and Directors General of railways are as yet really only managers, as the Secretary-General of the UIC has pointed out.3/.

3.05 More useful than broad new railway constitutions as a means to change this situation have been particular steps gradually worked out to steadily increase the railway management's degrees of freedom — by empowering management to alter allocations within agreed overall budget ceilings, to make payments without Finance Ministry preapprovals on each occasion, to choose contractors and staff without Government directive, to take appropriate disciplinary measures with poorly performing staff, to give bonuses and promotions for exceptionally good performance, to negotiate tailor-made contracts with major shippers and to alter tariffs within certain ranges. Considerable liberalization has been gradually achieved in some countries, notably Brazil and Korea, by measures such as these, and it is absolutely crucial that steady progress be maintained. As more powers are given, there is corresponding need for management-level staff to receive increasing training, both in modern techniques of management, to make use of the increased freedoms, and in the modern public service objectives, stressing commercial viability and adjustment of service to customer needs.

3.06 The value of foreign technical assistance at the management level depends considerably on the ability of the railway to provide adequate counterparts, and of the technical assistants to communicate knowledge relevant to the situation of the railway. But it is also important to give precise and updated terms of reference to these technical assistance groups, and to create effective mechanisms for deciding about and, where appropriate, acting on their recommendations. Also control mechanisms need to be set up for assessing the teams' progress compared with objectives, and for regularly evaluating the performance of the individual members, especially in regard to counterpart training and adaptation of their knowledge to local circumstances. Contracts should normally be for not more than two years, renewable on good results.

3.07 The principal institution-building effort of the Bank in the railways field has been to help build up certain central functions, often more concerned with strategic management than day-to-day operational control. Probably the largest impact of the Bank to date at the management level has been in the development of stricter standards of analysis for proposed new investments in the railways, and of planning staff to undertake such analyses. Systematic and persistent emphasis has been given to this area, and progress has been made, even though trained staff often remain too few.

3.08 Second, the Bank has often given considerable attention to developing the marketing function, and played a substantial part, for instance in Spain, Thailand and Yugoslavia, in the creation or major upgrading of Marketing and Commercial Departments. Third, the Bank has usually tried to strengthen costing, a function that takes on wholly new importance as a railway moves toward commercial operation because accurate costing alone can show which traffics are worth pursuing, at what price, and where losses are really occurring.

3.09 While useful efforts have been made by the Bank to help improve railway management, and some important successes have been scored, it is hard to avoid the overall conclusion that there is a disproportion between the depth with which this aspect is examined in project preparation and appraisal and the seriousness of management problems as they often manifest themselves during project execution. More effort is needed in project preparation on management questions.

3.10 Several broader management issues -- less specialized than planning or marketing -- are particularly in need of increased attention. One is recruitment of management staff. Too many railways are reluctant, or unable (for salary, or sometimes labor-union, reasons), to recruit and retain management staff from outside, who could leaven traditional styles and bring in new specialities. Very few borrowing railways have adequate programs to recruit young potential managers with university education, or to identify young existing employees with great promise, and give them special opportunities for experience and training which will put them on the fast track to senior jobs. Excessive proportions of existing management have risen from the ranks and lack the education necessary to make full use of modern managerial techniques.

3.11 Second, more attention should be given to the railway's needs for management (as opposed to technical and economic) training at the senior and middle levels. There is a shortage of good courses specifically oriented to general railway management and covering subjects like motive power management, rolling stock maintenance, spare parts management, workshop productivity, purpose and place of field inspections, conducting personnel evaluations, raising staff motivation through incentives and punishments, resolving union problems, assessment of shipper transport needs, principles and uses of costing, establishment of departmental performance targets and effective use of periodic control reports, etc. Hence courses of appropriate coverage may need to be specifically designed for the borrower and given at its headquarters.
3.12 Third, existing management information systems need systematic review and evaluation from the managerial perspective, examining the timeliness and adequacy of the data made available to the different levels of management and the way in which such data are presently used. This can provide a uniquely valuable window into any broader management problems, such as the balance of centralized/decentralized functions. Broadly the common tendency in modern railway companies has been to centralize control of wagons and motive power and other common resources increasingly as communication techniques have improved, and to maintain, or even increase, regional responsibilities and degrees of freedom in day-to-day personnel management, purely regional operations and, especially, commercial functions. Most Bank borrowers have been gradually moving toward these directions, but the actual functioning of the evolving management structures needs to be improved. Costing and budgeting systems merit particular attention because of their special significance in a decentralized management structure and the continuous need in any railway for their improvement.

Staff

3.13 The key staff issue is training and it is clear by now that while the Bank has made valuable contributions in some cases, it has generally given insufficiently close attention to this area in the past. The Bank has tended to assume too readily, especially in some African countries, that large numbers of reliable expatriates would continue to be available and used, or that on-the-job training could be the full answer.

3.14 In a few borrowing countries such as Korea and Mexico railway training has now been put on a very sound footing, but in many others special studies are required during preparation of railway projects to inventory existing personnel and skills, identify present and prospective skill shortages (allowing for often inevitable high staff-turnover) and to prepare a phased program of recruitment and training actions to fill the gaps. Such studies can be difficult and time-consuming, and they require a combination of knowledge of railways with familiarity with local conditions to reach sound judgements on the choices that often arise between adapting to local conditions and trying to change them. The studies should be started early, so that results are fully available by the time of project appraisal, to allow provision for needed complementary facilities, equipment or trainers out of grant funds or, if necessary, Bank lending. The training needs appear to be so great (typically, at least 10-15% of total staff above the grade of laborer per year), and in significant part specialized, that most railways warrant their own centralized training institution for most trades. In all cases a staff training department, to concentrate responsibility for organizing and promoting all forms of railwaymen's training inside and outside the railway, is needed.

3.15 Manpower planning studies of the type recommended can also help to resolve problems of uncompetitive salaries and inadequate link between salaries and responsibilities. For instance a study undertaken by the Brazilian Federal Railway a few years ago succeeded in securing substantial wage increases for skilled personnel attaining prescribed qualifications, in combination with reduction of total staff members.
3.16 The other principal staff issue which is central to improvement of overall efficiency is reduction of rigidity in work rules and manning rates. This raises difficult social and labor-relations problems, considerably complicated by the fact that railway staff are in some respects a privileged class in many countries, protected by exceptionally strong labor unions. Numerous Bank borrowers have in fact been able to make notable progress in reduction of staff numbers, but progress has not always been sustained and has tended to be relatively weak in Africa. A key responsibility of railway management is to convince the labor unions that adjustment is essential to the railways' future and to negotiate out acceptable formulae for progress in this direction. Labor representatives must become contributors interested in the rationalization process and its successful accomplishment.

**Action Plans**

3.17 Action Plans, as developed in connection with Bank lending for railways, are essentially a technique for focussing borrower and Bank effort on the specific steps to be taken in certain agreed areas of priority to overall efficiency improvement. Key performance targets for the priority areas are worked up during project preparation and appraisal, along with plans for the measures required to enable them to be reached; the targets are then systematically followed up during project supervision.

3.18 Experience shows that while Action Planning is definitely a major improvement over earlier exclusive dependence on overall financial performance measures, it is a difficult technique to use well. First, it requires a very sound and broad-based diagnosis of the railway to identify its particular priority problems and potentials, select economically worthwhile technical improvements and find ways of measuring progress on them; the 'Plan' easily degenerates into a mere collection of standard indicators not particularly related to the problems of the railway. Second, very difficult judgments are involved about feasible future efficiency, which, if over-optimistic, may lead to costly underprovision of equipment, and equally, if under-optimistic, may lead to overprovision of equipment.

3.19 Third, behind the targets there needs to be an in-depth analysis of the causes of the present problems and of the specific steps needed to overcome them. Fourth, there must be sufficient agreement and understanding of these steps and their purposes that management will not try to meet the selected targets simply at the cost of others or by, for instance, departing from regular preventive maintenance schedules; where this danger exists, adherence to maintenance schedules and adequacy of repairs after unexpected failures may themselves need to be targeted. Fifth, railway management must preferably be heavily involved in, if not responsible for, preparation of the Action Plan, and at the least fully convinced of the importance of the items identified in it, of the feasibility of the steps proposed and of the need to check regularly on progress; the latter normally requires a reasonably effective and timely management information system for assembling data from many regions and departments, at least quarterly and preferably monthly within about ten days of the end of the month.
3.20 Sixth, the indicators chosen need to be sufficiently general to have broad significance, but they (or their components reported along with them) need to be sufficiently specific to be meaningful to local managers. Seventh, active and sensitive field supervision is often required on the part of the Bank, to go constructively into the reasons for deviations from the targets and to help identify the measures required to catch up. Eighth, the targets frequently require updating because external events such as natural disasters, major accidents, harvest failures, long strikes at important traffic-generating enterprises or serious procurement delays can render them quite unrealistic.

Motive Power Improvement

3.21 One of the most important and potentially rewarding technological changes through which most of the Bank’s borrowing railways have been moving has been replacement of steam with diesel and electric motive power. However, in many countries the modern traction methods continue to give rise to severe difficulties. The joint efforts of the railways and the Bank have seldom sufficed to bring about a significant sustained improvement in diesel locomotive availability rates, other than possibly in Korea, Taiwan, the Brazilian Federal Railway, and to some extent in Yugoslavia, in all of which cases availabilities were already relatively high. Except on these railways targets for improvement have rarely been met. Most countries in Africa show significant deterioration over the last 10-15 years, and several Latin American railways also fall below 66% availability rates.

3.22 Low locomotive availability has a negative effect on rail services, capacity, traffic and cost. The lower the availability, the higher the stock of locomotives required to carry a given volume of traffic. For example, availability in the range 50-60% implies the need for a stock of locomotives nearly two-thirds larger than if availability were about 90%, which is the lower limit of most continental European or United States railways; with each locomotive (approximately 2000 hp) costing some US$800,000, the extra investment is not insignificant. Even more seriously, significant shortfalls in availability below expected levels often lead to absolute shortage of railway carrying capacity, causing diversion of traffic to more expensive modes. Costs to the economy of such unexpected diversion or frustration of traffic are particularly high because the capacity that has been provided in all other aspects of railway operations (personnel, track, wagons, etc.) is rendered unusable by the small shortages in haulage capacity.

3.23 Great care is required of railways in their selection of locomotives. Attention is needed both to technical aspects such as past performance experience with the model offered and suitability to local conditions, and to price and financing aspects. While the Bank has always stood ready to finance locomotives, lending for them is often available from bilateral credit agencies more easily than for other types of railway investment, with the result that the Bank has been less important in financing its borrowers' locomotive acquisitions than other parts of their programs.
3.24 The most successful purchases of locomotives appear to have been based on international bidding against specifications very carefully drawn for the particular railway's circumstances, emphasizing such aspects as proven reliability under similar conditions, robust design, ease of maintainability, compatibility with existing mainline fleet, quality of after-sales service and continuing availability of spare parts. Depending upon the case, the bids may be required to include financing terms, or the winning bid may be planned from the start to be Bank-financed. Alternatively, a combination approach may be used, as effectively applied in several instances, where the Bank includes in its loan a provision for locomotives which is automatically cancelled if satisfactory alternative finance becomes available.

Workshop Rationalization

3.25 While it is easy to conclude that the Bank should, in retrospect, have advised borrowers to plan fleet additions on the basis of less optimistic projections of equipment availability, the much more important conclusion appears to be that more should, and could, be done about measures to attain reasonable levels of availability. While workshop rationalization and improvement have been an important part of many Bank-assisted projects, they have not often received the emphasis and detailed attention that they seem to need. The locomotive problems appear to have arisen basically either from inadequate workshops, whether in respect of their facilities or their operation, or from failure to ensure a steady flow of appropriate spare parts to the workshops, or both.

3.26 Modern shops, designed from the start for diesel and electric work, with appropriate specialized equipment and sufficient capacity to cope with expanded fleets, are an overdue need in many countries. Workshop improvements are among the more complex components of railway investment projects. To avoid delays, particularly good coordination and sequencing are required among the various elements involved -- acquisition of land for expansion, design and contracting of building, arrangements for training of skilled staff, selection and bidding for equipment, delivery of the various equipment items, ordering and arrival of spare parts for regular operations, technical assistance to advise on layout and workflow and to assist start-up.

3.27 The principal difficulties in workshop operation have been shortage of skilled workers and insufficiently rigid observance of regular preventive maintenance schedules and procedures. These problems can only be remedied with larger initial training programs, making more adequate allowance for drop-outs and resignations, and, in some cases, by regrading of staff and introduction of incentive systems. Disciplined planning of maintenance, to adhere to schedules without running into bunching and bottlenecks, and disciplined execution of all prescribed maintenance steps, are crucial. Recovery from a period of relaxed maintenance standards is often difficult, because unexpected equipment failures tend to mount rapidly. But a thorough inventory of the state of existing rolling stock, especially locomotives, should enable better predictions of maintenance loads and availability rates than have so far normally been made. Another aspect of workshop operation
which often needs improvement is costing. This is important not only for controlling costs and identifying steps to increase efficiency of workshop operations themselves, but also for enabling sound decisions as to when equipment should be retired.

3.28 A critical dimension of railway equipment maintenance which has often caused major problems is the provision of a regular flow of appropriate spare parts. Financial mechanisms to ensure the timely availability of sufficient funds for this purpose are the first essential. Supplier credit agencies appear to have been reluctant to finance spares, in some cases even going so far as to back up their manufacturers in insisting that credit could be provided for spares for existing equipment only if the borrower bought new equipment at the same time. By contrast, the Bank has been wisely liberal on this score, accepting even sizeable amounts of reserved procurement where necessary. But more needs to be done to establish more permanent domestic mechanisms for ensuring that the necessary small amounts of foreign exchange are always channelled to this very high-priority use. The formulae applied in several recent loans, of making Government release of foreign exchange for this purpose an important condition of loan negotiations, or of agreeing on Government provision of matching amounts to loan provisions for the purpose, need to be extended to include firm agreement on the amounts that should be required over the coming years and the ways in which they will be provided.

3.29 Inventory management is the other aspect of spare parts supply which often needs substantial upgrading. Modern management methods — establishing accurate and consistent recording systems, setting firm order-points, focusing special attention on items that are subject to high turnover or costly, arranging for efficient in-country distribution, etc. — are particularly necessary, given the variety of requirements and the very long delivery times that borrowers typically experience. Procurement of spare parts can sometimes be significantly improved by using competitive bidding instead of taking the obvious course of returning to the original manufacturer.

**Line and Service Closures**

3.30 While the significance of the problem varies among countries, all railway managements need to be continuously on the look-out for operations that they should be seeking to get out of. Recent costing exercises for a range of borrowing countries suggest that the avoidable costs of uneconomic lines often account for as much as 5% of total operating costs — even for railways that are only marginally unprofitable overall — and in some cases substantially more. The extent of the problem depends largely on the pace and pattern of change in economic geography since the railway network was laid out, on the degree to which other transport modes have developed and on the railway company's general level of operating efficiency compared with other transport operators. It is particularly serious in some of the larger countries in each continent. Only very few countries, such as those with a simple network related to mineral developments that are still in expansion, largely avoid the problem.
3.31 The historical experience underlines the importance of steady effort at the necessary reduction of service and disinvestment, because the changes can seldom be brought about rapidly. Several Bank borrowers, most notably Yugoslavia, have made good progress with reductions of particular types of operation over prolonged periods. But the general picture has been rather disappointing. Consultant studies of lines and services considered for closure have often been too narrowly financial or failed to cover an appropriate range of alternatives. Railway authorities have been slow to follow up on studies once completed. Making the subsidies involved an explicit charge on central Government budgets has seldom had the hoped-for effect of stimulating greater Government scrutiny of the economic desirability of keeping the line or service open. Energy uncertainties can now be used by the beneficiaries of highly subsidized services as a further tactic to delay appropriate study and decision.

3.32 The fact that a particular line is not financially profitable, even on an avoidable costs basis, does not of course necessarily mean that it is uneconomic and should be closed, but it does indicate that the line needs to be subjected to economic analysis. Rough physical criteria of the need for such analysis are annual traffic of less than 400,000 net ton-kilometers of freight, or less than one million gross ton-kilometers of freight and passenger movements, per kilometer of line\(^6\); or, for freight stations, annual volume of less than 500 freight-cars.

3.33 The economic analysis has to compare the costs to society as a whole of alternative courses of action, ranging from keeping the line and the services on it as they are, through carrying existing and prospective traffic at lower service-standards (e.g., reduced frequency of service, closure of some stations, lower staffing or maintenance standards) and possibly transferring some traffic to other modes, to carrying all traffic by other modes following total closure of the rail services. Each alternative will have associated streams of costs — capital (e.g., for upgrading the competing road or providing more buses), renewal, maintenance and operating. Uncertainties with regard to future availabilities and prices of different fuels can be factored in by sensitivity testing where there are marked differences between alternatives in fuel requirements. The alternative showing the lowest net present worth of costs should be chosen — and the steps necessary to achieve it should be actively promoted by the railway. This may involve pressing for the completion of a competing road link, the existence of which is often a precondition of closure, or assisting the start of bus/freight service by a local businessman.

Track Maintenance and Upgrading

3.34 Track works are usually one of the most important investment categories in Bank-assisted railway projects, but they often cause serious

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6/ More than 40% of the network has traffic density below these levels in the following countries: Argentina, Brazil, Indonesia, Malagasy, Spain and Sudan. Between 25% and 40% of the network falls below these levels in Pakistan and Turkey.
implementation problems, and sometimes pose fundamental questions with regard to their economic justification. Track works are typically a combination of, on the one hand, deferred maintenance, restoring the track to its former quality — for instance by reballasting, reseamer, and renewal of the rail itself — and, on the other hand, upgrading, by installing heavier rail, welding it, or introducing improvements in alignment, to reduce grades and curves. The principal problem faced by most of the Bank's borrowers is extensive mileage of over-age track (and bridges), due to past insufficiency of funds for maintenance and renewals, with the consequence that speed restrictions have had to be imposed at many points. Electrification, which is a major component of a few projects, is in a sense a more substantial form of upgrading.

3.35 Track works appear to need very careful engineering and financial preparation to avoid the problems of delays and/or cost overruns to which they have been subject in almost all Bank-assisted projects. Some of the problems that have arisen in the past could be avoided by insisting upon completion, by the time of loan approval, of detailed engineering needed (i.e., for any substructure works or alignment improvements involved), of bidding documents for supplies and equipment, and of contractor prequalifications in the case where contractors are used to supply materials or to carry out the work. But more attention is also needed to the quality of the basic data used to estimate quantities, and to the effective capacity of the railway or domestic contractors to actually execute the work at the pace planned. Even with better cost-estimating and planning, unforeseeable uncertainties of weather, international supply and labor go-slow will often cause the work to take somewhat longer than expected. Appropriate financial contingency allowances are therefore needed.

3.36 Sound planning of track works is further complicated by the difficulties of properly establishing the economic benefits to the various possible levels of upgrading that may be considered. Following various Bank-assisted track renewal projects, train speeds have not increased as expected, apparently due to operational and physical constraints in other aspects of the system (e.g., wagons, bridges, timetables), or derailments have not come down, due to disciplinary problems or rolling stock deficiencies. Yet savings in track maintenance costs, substantial though they often are because of the age of the track being renewed, are very seldom sufficient in themselves to produce a good return to the investment.

3.37 Track renewals sufficient to raise maximum freight-train running speeds to 60 kph and average speeds up to 40 kph (and maximum passenger-train running speeds to 80 kph), by eliminating sections with severe speed constraints, do not normally present problems of economic justification, provided bridges are included and traffic is well above 1 million gross tons per year. The amount of realignment proposed does need to be carefully scrutinized and in some cases it may well be found best to limit it to elimination of sharply curved sections only. For lines carrying less than 1 million gross tons (400,000 net tons) per year even so-called 'essential
renewals' require very careful scrutiny, with special attention to the lines' medium- and long-term traffic prospects; the alternative of conversion to a road would often be worth close analysis.

3.38 Even for important lines, carrying much more than 1 million gross tons p.a., improvements to higher standards than those cited above require thorough consideration of the extent to which other aspects of the railway system will be ready to take full advantage of such standards: generally a joint economic analysis should be undertaken, covering the complementary operational and investment measures needed, and roughly quantifying combined benefits. Particular care is needed to assess whether any traffic expected to be attracted to the railway by the improved service level is really likely to transfer.

**Train Operations**

3.39 Changing patterns of demands for railway services and of capacities available for meeting them create a permanent need to better align the one with the other. Past lags in adjustment mean that most railways have potential for substantial operational improvements. Significant cost savings can often be realized within relatively short periods of time, by increasing the intensity with which equipment is used. Besides cost savings, however, operational improvements can often also result in significant improvements in service quality, as for instance in speed of transit or reliability of schedules, thus attracting traffic which might otherwise choose alternative modes. Relatively small investments in complementary equipment -- for instance, for loading/unloading rail-cars -- or in telecommunications can have major impact, but in many cases operational improvements can also be made by managerial initiative, with little if any investment.

3.40 If operational improvements do not require much investment, they often do depend on careful planning ahead, both for the medium term in the form of planning for change, and for the short term in the form of tight operations scheduling, usually called 'operational planning'. There are normally various ways to get a fuller use of equipment: tightening the time between jobs, reducing the amount of marshalling required or the time it takes, ensuring heavier loading of wagons or trains, increasing daily hours of operation, raising train speeds, making the service more attractive to customers, etc. Once the potential for any one of these, or a combination of them, has been identified, the measures necessary to achieve them have to be thought through and spelled out: they are likely to be multiple, and ineffective except in combination with one another. Simultaneous changes may be required in allocation of responsibilities among different departments or units, organizational arrangements, working standards used, labor discipline and time consciousness, union-negotiated labor practices, and the package of services to which customers have been accustomed. The different parties involved have to be carefully prepared if the changes are to be successfully introduced.

3.41 While some borrowers have encountered great difficulty in preparing and implementing plans of this sort, others have had major success in
increasing operational efficiency. Many of the main improvements made -- such as rationalization of less-than-carload (LCL) traffic, increased use of unit and block trains, tighter adherence to freight train schedules, introduction of clock-face timetables for passenger trains, reorganization of track use to increase available train paths -- have been accomplished with only very small capital expenditures.

3.42 Signalling and telecommunications merit special mention for their potential to improve train operations, as well as other dimensions of operating efficiency, and to increase system capacity, at relatively low cost. There is often a tendency, however, for consultants and manufacturers to overdimension proposed investments by jumping stages or in other ways. Major improvements on many lines can be made simply by introduction of tokenless block plus quite simple telecommunication facilities. Thus plans need to cover both signalling and telecommunications and to separately identify the proposed roles of each. They should compare alternative staged sequences of development in terms of the present worth of costs as well as of net benefits, since benefits are hard to quantify soundly although they can be substantial.

Conclusions

3.43. Effective management of a railway means bringing about gradual but steady structural change -- in physical facilities, transport philosophy, personnel policies, management systems and operational practices. It is essential that, in recognition of the enormity of this job and the importance of the railway system in their economies, Governments ensure that railways enjoy the most experienced and imaginative leadership the country can provide, and then support that leadership by giving it increasing freedom to act commercially in fair competition with other modes of transport.

3.44 The Bank's main effort to help bolster management discipline at the operational -- as opposed to investment -- level, in the form of Action Plans, is occasionally resented by borrowers, as an undue interference in day-to-day affairs. Understanding, caution and judgment are certainly required in high degree from the Bank. It is normally preferable to err on the conservative side in forecasting efficiency improvements, especially for the early years, to avoid bottlenecks from underprovision of equipment and the psychological cost of failure to meet targets. Also, the more of the work of preparing Action Plans, selecting targets and identifying necessary underlying measures that can be done by the railway management unaided, the better. But the kind of improvements that are summarized in agreed Action Plans are so essential to the eventual economic viability of the investments assisted by the Bank that to make railway loans without such agreements would be a derogation of its responsibility. The stronger the railway's management becomes the less the need for the Bank itself to go deeply into details of the measures needed and the allocation of responsibilities for them within the railway enterprise.
With better preparation of investment projects and their accompanying Action Plans, the need will still arise for frequent revision of targets in light of unpredictable outside events and unforeseen internal bottlenecks. Excessive flexibility can render planning ineffective, as shortfalls simply lead to downward revision of targets. On the other hand, inadequate flexibility can make planning unhelpful or meaningless, as targets become impossible of attainment. During a period when railways are undergoing substantial structural change, operational targets three or four or more years in the future may provide a useful general orientation, but the main use of Action Plans is in helping to specify and coordinate short-term actions. Annual revisions may well be most appropriate; reports on performance under Action Plans could reflect both original target establishment at the time of loan agreement and the latest annual revision, as well as the actual performance achieved.

IV. The Financial Problem

Few of the Bank's railway borrowers of the last twenty years were in strong financial condition when they first came to the Bank, and some were heavily subsidized; in some cases they had been led to the Bank by their Government's finance and planning authorities specifically with a view to reduction of their need for operating subsidies. The Bank has always given close attention to its borrowers' financial performance, and loan agreements almost always included financial performance targets. The end-objective, sometimes expected to take more than one loan period to accomplish, was normally to improve financial performance to a level where the railway would be able to pay all costs including the service of all accumulated debt and in addition to finance about 30% of investment out of internally generated funds; this would normally mean, for a railway, an operating ratio (ratio of operating costs including depreciation to total revenues) in the range 75-85.

Actual results have almost always been disappointing, and operating ratios have usually been substantially worse than expected. One main reason was already discussed in Chapter II: use of overoptimistic freight traffic forecasts. A second equally important factor has been inadequate allowance for increases in wages and other costs, and borrower failure to adjust tariffs in timely fashion to keep up with inflation. And a third factor has been delays in the achievement of efficiency improvements expected to result from investments or from implementation of agreed Action Plans. By the end of the 1970s most Bank borrowers had operating ratios in excess of 100.

Comparing the late 1970s with the situation ten years before, the financial performance of almost all the Bank's borrowers has deteriorated as has that of the European railways. But there are also important differences between the two groups. First, only four or five borrowers — mainly important railways in Latin America — show equally poor or poorer financial results than the Europeans, meeting only a fraction of even their working expenses (i.e., excluding depreciation) out of service revenues. Second,
European railways' working costs per traffic unit have tended at best to remain stable in real terms since productivity increases were offset or more than offset by real wage increases. By contrast, many borrowers, especially in Asia and Latin America, have shown substantial falls in working costs per traffic unit in real terms, as traffic expanded rapidly, employment increased slowly or was cut back, and wage increases were held below productivity growth; similar, but smaller, cost reductions have occurred in Africa, but there they have often been connected with reductions in real wages more than with any substantial productivity increase. Third, the fact that the borrowers' financial performance nevertheless deteriorated was due, to a much greater extent than in Europe, to substantial real reductions in tariffs (for example some 35-45% for freight and passengers alike over the ten-year period 1968-78 in Mexico and Thailand), implying that shippers and passengers benefitted substantially; it is most unlikely that changes in traffic composition or in costs of alternative services warranted such substantial falls, and, had the reductions been kept to more reasonable levels, financial performance would have been substantially better.

4.04 State support to the railways in the developing countries does not reach anywhere near the billions of dollars a year of several European countries -- for instance nearly $4 billion in France and $5 billion in Germany in 1978 -- but, because of the greater importance of the railway enterprise in their smaller economies, such support can be equally if not more important in fiscal terms. Thus, taking consolidated central government revenue (as given in the IMF's Government Finance Statistics) as the denominator, Government support7/ to the national railway in the middle and late 1970s accounted for more than 5% in Argentina, some 4% in Germany, Mexico and Yugoslavia, 2% in Brazil, France, Mali, Senegal and Spain, around 1% in Bolivia, Cameroon, Congo, Great Britain, India, Indonesia, Korea, Netherlands and Pakistan, and small fractions of 1% in only a few countries such as Malaysia, Sweden and Thailand.

4.05 Despite this generally depressing picture, a few borrowers -- notably India, Korea, Mexico and Pakistan -- have shown some improvement of financial performance since the mid-1970s, although they have yet to regain the levels of ten years before. Moreover, the speed with which improvement can take place is illustrated by the dramatic declines that have occurred in some Bank borrowers' operating ratios: for example, within two years, from 143 to 88 in Bolivia, 102 to 85 in Mali, 164 to 123 in Mexico, 128 to 105 in Senegal, and 121 to 94 in Thailand. Frequent change of Government has not necessarily prevented sustained progress. Even if it has not had steady success in helping its borrowers to improve their financial performance or even to keep tariffs up with inflation, it is clear from the record that persistent Bank pressure has been helpful in a number of cases in securing more adequate tariffs than would otherwise have prevailed.

7/ Including operating subsidies, equity contributions and Government loans.
The Case for Subsidies

4.06 There are three principal categories of argument for provision of state support to the operating costs of railways, but none carry much general conviction when examined closely. The first sees subsidies as having less inflationary impact than the tariff increases that would otherwise be necessary. The second argues for subsidies as an income-redistribution measure. The third bases its case on the need to equalize competition among transport modes by compensating railways for special disadvantages that they allegedly suffer.

4.07 Probably the most important single factor depressing the financial performance of the Bank's major borrowing railways in the 1970s has been Government delay in approving tariff increases, partly for administrative reasons but mainly in the hope of stemming inflation through positive effect on the cost of living and on business psychology. Except in the few cases where the reductions, or delays in approval, of tariff increases were held to minor proportions, they have in all cases led to the initiation (or substantial increase) of operating subsidies.

4.08 No studies appear to have been carried out to assess the real effectiveness of delays in railway tariff increases as an anti-inflation weapon. But it is hard to see how they could come to a positive conclusion. Inflation, i.e., the process of continual increases in the general price level, is an economy-wide problem and therefore can only be effectively controlled by economy-wide measures, such as reduced Government spending or increased taxes. In a number of cases railway deficits have directly promoted inflation by contributing substantially to overall Government deficits. Second, to the extent railway traffic is price-elastic, overall demand pressure on the economy will be stimulated by subsidization except in the unlikely situations where other modes are more highly subsidized or where the railways have such large excess capacity that the additional traffic could be carried without significant increase in total cost. Third, there is increasing empirical evidence, discussed in Annex IV, that provision of subsidies to public transport enterprises does in fact easily have the cost-increasing, productivity-reducing effects that would be expected in theory: once the public coffers are open, financial discipline cannot be as effective as it was before. Thus there is a significant inflationary impact from the supply side too.

4.09 General social considerations have been adduced fairly frequently in the 1970s as arguments for keeping passenger fares, and sometimes freight-rates for basic necessities, below costs. In many of the poorer countries such policies have had very negative effects on the ability of the railways to expand and upgrade services and attract more custom. As regards the direct income-distribution effects, unfortunately no studies appear to have been made in the less developed countries and no data are available on even basic aspects such as where passengers of different railway services fall in the overall income-distribution scale or what is the significance of rail travel in the total consumption of different income-groups. However, analyses undertaken in several industrialized countries have raised profound doubts about the income-distribution effects of railway subsidies there. Inclusion of second-round effects in the analysis — such as the effect on rents and wages in metropolitan areas with subsidized suburban services, and more broadly on regional patterns of development — would likely lead to even more negative conclusions.
4.10 The most important group of arguments relating to equalization of competition concern principally road/rail choices. It is pointed out that road vehicles, especially when moving in towns, seldom pay for the external costs they cause, especially congestion, and noise and air pollution, whereas the railways' congestion costs are necessarily internalized, and their noise and air pollution are normally comparatively limited. Second, it is claimed that, whereas the railways have to pay all their own infrastructure costs (capital charges on construction, plus maintenance and renewals), heavy trucks are not making a fair contribution to the costs of highway infrastructure, as demonstrated by studies in many countries.

4.11 There is no doubt that actions could and should be taken by many Governments to charge road users more adequately for the costs they impose on society, and the Bank should further increase its effort in that direction. But the question is whether, in view of the political difficulties of bringing about these desirable measures, addition of a subsidy to the railway to balance existing implicit subsidies to road users can have the desired effect of improving inter-modal traffic distribution. Experience to date has not been promising. To the extent that subsidies to urban mass-transit have reduced transit prices and thus got through to the consumer, they appear principally to have generated more transit trips by people who would otherwise have walked or bicycled or not gone out at all, and to have been relatively unsuccessful in reducing the number of cars using the city streets. As regards long-distance haulage of freight, the tendency on both sides of the Atlantic appears to be increasingly to believe that price adjustments of the order of magnitude implied would hardly make a significant difference to the overall balance of road/rail use, modal distribution being much more dependent on the service requirements of different types of traffic and the quality of service offered by the competing modes. Moreover road transport, even if undertaxed, is still in some countries overregulated, such that, if both wrongs were righted, as they should be, this might well sufficiently improve road service quality as to offset or more than offset the effect of any subsidy to the railway to compensate for undertaxing.

4.12 An entirely different type of argument from those discussed above relates to certain budgetary items which tend to be high for railways compared with transport operators in other modes, particularly staff benefits and pension costs. Some railways are burdened with substantial pension obligations relating to an era when the railway was a far larger employer. These excess costs, like those of debt outstanding on closed lines and facilities, are irrelevant to present decisions about how best to use the railway and should indeed be removed from the railways' books in one way or another. On the other hand, it is hard to see justification for any special state contribution to benefits, whether or not better than those offered by other industries, for current employees.

4.13 Lightly trafficked branch lines which economic analysis shows it to be worthwhile to keep open for a few more years, pending the time when major renewal would be required or a parallel road will be completed, represent a special case of the argument for subsidies to help achieve a more efficient
modal split. A specific subsidy to cover the difference between avoidable costs to the railway, negotiated down to the minimum essential level, and maximum feasible revenue, by raising prices as close as possible to avoidable costs, may be justified during the limited period that it is worth keeping the line or service open. In practice, however, many subsidies and cross-subsidies presently provided on this score tend to be rather for lines that it would be more efficient to close down and replace with road transport.

4.14 Finally, account must also be taken of the other side of the coin of subsidies, generally forgotten in railway debates, in the form of important costs to society as a whole. If the necessary funds are raised in the form of additional taxes, then there are the collection costs involved, not likely to be less than 15-20% of the sum raised. If they are diverted from Government programs in other areas, then the costs involved are the benefits foregone by cutting back such programs.

Appropriate Financial Objectives

4.15 The basic objective in establishing financial and pricing policies for railways should be to help them carry through as quickly and efficiently as possible the structural change that is essential to their future. Targets and policies thus need to be conceived in such a way as to exert continuing pressure on management, staff and customers towards increased efficiency. They should encourage and facilitate the closure of services, stations and lines that are no longer economically competitive with other forms of transport. They should help ensure availability of the wherewithal to properly maintain equipment and track that are still needed and to carry through cost-reducing and traffic-attracting innovations such as the workshop rationalizations and operation and service improvements described in the last chapter. They should help to guide the selection of worthwhile investment projects and to enable such projects to be carried through efficiently without delays resulting from shortage of cash flow. They should serve to attract traffic in which the railway can have continuing comparative advantage, to discourage other traffics, and to encourage management and marketing efforts in these directions.

4.16 A comparative advantage for the railway in carriage of a particular traffic means that it must be able to offer conditions of service and price such that it can attract and hold the traffic and not lose money on the deal. Losing money means quite simply that additional revenues from carrying the traffic are less than the additional costs involved in carrying it. The appropriate concept of cost is thus marginal costs. Whether they should be long-run, medium-run or short-run will depend on the decision to be made: provision of service to a new mine, involving construction of an access line and acquisition of additional rolling stock, will clearly not be worthwhile unless prospective revenues are sufficient to cover long-run marginal costs; initiation of a new fast container service involving some line upgrading and purchase of new specialized cars will not be worthwhile unless revenues cover at least medium-run marginal costs; while introduction of discounts for off-peak passengers or backhaul freight will be worthwhile if the net
additional revenues that result more than cover short-run marginal costs. The expression 'relevant-run marginal costs' is therefore often used to refer to these various concepts generically. Prices should always be set at short-run marginal costs, investments and services having been sized by the above-discussed decisions so as to equate relevant-run and short-run marginal costs.

4.17 Much has been made over the years of the notion that railways, in their retraction phase, are declining-cost industries with substantial spare capacity; hence at the limit, if traffic is very responsive to price and the railway has unlimited spare capacity to carry it, tariffs set at short-run marginal (or variable) cost would not yield revenues sufficient to cover even such fixed portions of working costs as administrative overheads and normal essential maintenance and renewals. Closer study has shown that, even in the case of railways gradually losing traffic overall, a considerable share of track-maintenance cost is in fact traffic-related, congestion points still develop on the system and sharply raise short-term marginal costs, large portions of traffic are little responsive to price (because the railway is substantially superior to alternatives for them) and other portions are much more responsive to service quality (regularity, reliability, type of wagons, etc.) than to price. Thus properly discriminatory tariffs, reflecting marginal costs at different points and times on the network and including higher mark-ups over marginal cost the less price-elastic the traffic, can yield revenues sufficient to provide adequate service and cover overheads.

4.18 Even more important, the principle of overall 'budgetary equilibrium' for an enterprise -- in the sense of requiring it to earn at least sufficient revenues to pay all working costs, and the interest and principal due on debt -- has now been widely recognized as an invaluable, if not irreplaceable, tool for ensuring disciplined management and avoiding laxity in investment decisions, wage negotiations, marketing of services and day-to-day operations; nothing binds as effectively as the budget constraint. Economic and administrative principles together therefore imply that the target operating ratio for a railway not significantly expanding should be at most 100. For a railway needing minor expansion and modernization of operations, a somewhat lower maximum figure, say 95, would be appropriate, so that funds would be generated to cover additional interest and provide extra cash-flow for minor re-investment. Where use of the working ratio is preferred, because it is more easily understood or because satisfactory asset revaluation has not been carried out, a target of no more than 70-80, depending on the railway's capital structure and investment needs, would be appropriate. Achievement of either should mean that no operating subsidy would be required.

4.19 A railway that has become accustomed to a subsidized regime, or that has long been starved for essential operating funds, cannot generally be expected to attain these levels of financial performance overnight. In these situations, where subsidies are really a starting point, the need is to organize or re-organize the subsidy arrangements in such a way as to assist and expedite the process of structural change. Subsidies which, in effect, simply cover whatever deficit emerges at the end of an accounting period are
most destructive of financial discipline and least consistent with the objective of structural change. Subsidies which sustain low tariffs as an anti-inflation measure may merely delay the emergence of other more efficient transport solutions for particular traffics. Subsidies, or extensive cross-subsidies, should therefore be closely linked with the particular problems which are supposed to justify them and with programs agreed between Government and railway for overcoming or reducing those problems within a reasonable time-frame.

4.20 Besides agreed programs for bringing down subsidies, attention also needs to be given to ways of providing them, and to institutional responsibilities for paying them, which will exert pressure for their reduction. For the difficulty with subsidies is that most of the parties most involved often have no direct interest in their reduction. Increasing transfer of responsibility for them to local authorities may help in the case of suburban and branch-line subsidies, while arrangements for Government to make up the price of tickets sold on concessionary terms to specified categories of the population can help to increase the cost-effectiveness of subsidies intended to improve income-distribution.

Capacities Needed within Railways

4.21 Effective decision-making on the marginal-cost lines described is itself a capacity that has to be explicitly developed within a railway. It depends on competence in marketing, costing and operations management, and close cooperation between all three groups, both centrally and regionally. Marketing staff must have a good appreciation of the needs of existing and potential customers, and good negotiating sense. They must have a particularly sound knowledge of their railway's costs — and of the difference that would be made to them by addition (or deletion) of a particular type of service in a particular season or time-of-day. Costing staff must be able to provide the relevant cost data in the necessary detail and accuracy to correspond to decisions needed. Operations management staff need to be able to identify the scope for cost savings and for service improvements, based on costing and marketing findings, and they must effectively deliver agreed-upon improvements at expected levels of reliability and regularity.

4.22 As regards marketing, departments have been set up in a number of railways, as noted in Chapter III. Some railways with strong passenger potential have introduced important improvements in fare structures and operations. And various degrees of flexibility for negotiating freight rates, particularly with large shippers, have begun to be provided to central and regional managers in many countries (such as Argentina, Bolivia, Brazil, India, Kenya, Korea and Malaysia); but effective use of this scope is only gradually developing. Although such flexibility is the stock-in-trade of efficient trucking enterprises, it represents a major change in thinking for railway companies and regulators accustomed to notions of common carrier 'fairness' among all comers. Experience in Spain, Brazil, Britain and other countries shows also that the new concepts have to be introduced with care to avoid marketing services below cost, excessive service-quality guarantees, larger than necessary discounts to major users who are powerful but also tied
to railway services, non-response of operational performance to customer service requirements, etc. Marketing commissions, or alternative types of bonus or incentive, need preferably to be related to net revenue generated rather than to total volume of traffic obtained.

4.23 Most of the Bank's borrowers are at relatively early stages of the transition from traditional fixed rate-schedules only broadly related to the costs of different services (and some still including remnants of the ad valorem rate structure that was possible when rail had a monopoly) to the much more flexible, innovation-inducing system described above. Considerable effort has been made, with the aid of consultants financed under Bank loans\(^8/\), to improve their accounting and to introduce costing systems and build up costing units. This technical assistance in costing appears to have been particularly highly valued by the borrowers because it involved the application of new approaches to identifying costs, which then helped to show opportunities for cost-saving and to support applications for tariff increases. But the results have often been slow in coming, because the integrated nature of railway operations and the diversity of services offered makes costing difficult and because railway management did not always appreciate its importance.

4.24 Because it is at the heart of the structural transformation sought, a railway's costing capacity must receive more attention in Bank projects right from the preappraisal stage, and every loan should be expected to help the recipient railway take the most important next steps in making railway tariffs better reflect marginal costs and demand elasticities. At present it is hard for Bank appraisal missions to go beyond broad verification, by major commodity group, that tariffs correspond reasonably well to overall costs. At the other extreme in terms of railway sophistication, the U.S. western railroads have used day-to-day, even hour-to-hour, tariff variations in their successful effort to secure a much larger'share of the perishable produce market in the first year following railroad deregulation. Many of the Bank's borrowers have sharp seasonal variations in particular traffic flows and also suffer from fluctuating shortages of equipment -- not infrequently related to customers' tendency to use railway equipment for storage purposes. Yet few borrowers have adequate penalty charges to customers holding railcars, and seasonal and regional variations in tariffs are extremely rare. But it is only by proper recognition of marginal costs, including opportunity costs in the case of shortages, that railway managements can make appropriate operational decisions and that customers can be given correct guidance and incentives as to when and how to use the railway rather than alternative means of transport or ancillary services, such as storage.

\(^8/\) The Bank itself also issued in 1974 a useful manual, prepared by a former Bank staff member, outlining a simple costing system: F. Sander, "Railway Traffic Costing". The manual appears to have been successfully used in several countries, particularly in Latin America.
Government Policy Framework

4.25 Successful accomplishment of structural change will also depend on the broader framework of transport policy established by Government and on the incentives and flexibility that railway management is given to operate within that framework. First, the railway and its marketing department will not be given the right signals as to traffics in which it should have a continuing comparative advantage unless operators in the competing modes are stimulated by a reasonably unregulated environment and appropriate taxation to come up with the best solutions their mode can offer to any particular transport need. In the centrally planned members of the Bank the transport market tends to function more on the basis of cost analyses undertaken at ministerial level, while in so-called market economies more depends on decisions of individual shippers and carriers. But in either case efforts are underway nowadays to make the cost basis of transport and related decisions more realistic. That this should apply as much to the competing modes as to the railways is critical to pushing the railways in the right direction. In some countries road transport remains hampered by an excess of licensing controls on the number of vehicles operated, routes run, commodities carried, frequency of services, etc., and in many countries improvements are needed in the structure and level of fuel and vehicle taxation.

4.26 Second, Government must support the reforming railway management by approving, after appropriate study but without excessive delays, discharges of personnel and closures of services and lines that are required by the structural change objective. This has both a positive and a negative significance. Management needs to be positively strengthened by acceptance of sound recommendations that it makes, in line with its brief for structural change. But it also needs to be shown that Government itself believes in the brief and will not hesitate to close operations and require corresponding reductions in administrative overhead, thus eliminating managerial jobs, when they no longer have economic justification.

4.27 Third, the range of flexibility given to railway management for setting budgets, establishing tariffs, rejecting or accepting traffic, negotiating tariff premia and discounts, deciding marketing commissions and awarding wage bonuses for exceptional staff performance, needs to be continuously enlarged, as discussed in para 3.05. Even for the highly unusual cases where there is no conceivable alternative means of transport, so that the railway has monopoly power, it will normally be best to leave tariffs to negotiation between the railway and the large mining/manufacturing enterprise which is the typical customer in such circumstances. Rather than embarking on the virtually impossible job of effectively controlling the efficiency of particular railway contracts, borrowing Governments would be better advised to devote available skills to improving the capabilities of their own Departments and public corporations, which are often very large railway users, to approach their transport needs more commercially and to carry out modern cost-minimizing distribution analysis.

4.28 While these lines of general transport sector policy differ from those that have been applied in recent decades in many countries, they are
financial projections of alternative assumptions about important variables such as traffic, wages and tariffs are often helpful as the basis for discussing with Government and railway during appraisal and at loan negotiations appropriate measures for the railway to take when deviations occur.

4.39 Since serious lags in adjustment of rail tariffs to cost increases tend only to add to inflation it is highly desirable for Governments to make such adjustments as automatic as possible, by measures such as "indexing" rail tariffs to the costs of major inputs or by refusing to approve railway wage increases except in conjunction with necessary resultant tariff increases. Provisions along these lines have worked satisfactorily under several recent Bank loan agreements. Partly because such automatic arrangements are still difficult for many countries to accept, and partly because other aspects of railway operations are hard to predict, particularly during a period of structural change, it is generally useful to make provision for regular review with the borrowing railway of its annual budget shortly before it would enter into effect. Such review may need to occur simultaneous with, or some months after, revision of the Action Plan and review of any Annual Contract that the Railway has with its Government.

4.40 While financial targets are extremely useful tools for assisting accomplishment of structural change, they are only tools and overall indicators. Assessment of the success of programs of structural change has to go much deeper: even adequate overall financial performance can result from failures to reduce costs being hidden by excessive tariff increases, or from highly distorted tariff structures and excessive restriction and regulation of other modes. Thus shortfalls from the financial targets agreed between the borrowing railway, the Government and the Bank at the time of loan negotiations need careful analysis, to see whether they reflect original misdiagnosis, unexpected outside events or departures by Government or railway from their undertakings at appraisal and loan negotiations. Appropriate measures need urgent discussion with Government and railway when the shortfall looms. If those discussions reveal that the problem is major departures from earlier undertakings and that Government or railway have lost commitment to the basic objectives of a structural change program, the Bank should be quite ready to cease approvals for new commitments out of the loan, or even to suspend disbursements or call the loan. If on the other hand the problem is clearly one of original misdiagnosis or unavoidable outside events, the targets should be reassessed and, if need be, targets for the subsequent years, and the measures necessary to reach them, should be readjusted.

V. Balance Sheet of Bank Involvement

5.01 The purpose of this chapter is to answer the main questions raised at the outset regarding the Bank's work in the railways field, and to draw the broad lessons from past experience.

5.02 Railway lending has been both administratively expensive to the Bank and also beset with many difficulties. Railways are always prominent among problem projects in the periodic Bankwide project implementation reviews. The Bank's ex-post evaluation system indicates that project
economic returns fall short of expectation more often, and are typically somewhat lower, for railway projects than for highway projects. Higher administrative costs to the Bank combined with a lower rate of benefit to the borrowing countries on the funds loaned would seem to make a strong prima facie case for diverting effort into other fields.

5.03 Railways are of course almost uniquely complex and large among the project borrowers that the Bank may have in a country. A few borrowers in the fields of electric power or telecommunications may be larger in sales or capital invested, but not in labor force engaged; their day-to-day operations are more concentrated physically and easier to manage. Moreover they tend to be operating in rapidly expanding markets where it is not difficult to charge fully remunerative prices. They do not face the vast shifts in comparative advantage and demand structure that are at the root of the railways' difficulties. They have generally developed more recently and face less need for managerial and human reorientation. Nonetheless, if the uniquely complex and large problems presented by railways are so resistant to change that Bank efforts to help deal with them yield comparatively little result it would be better to drop railways from the Bank's lending lines.

Bank Administrative Costs

5.04 The cost side of the ledger can now be reasonably accurately established on the basis of the Bank's staff time recording system. Table 5.1 shows the broad picture for all type of project for which the Bank made a significant number of loans in recent years. It aggregates the professional-level staffweeks spent on preparation and appraisal of each project presented to the Executive Directors over the three FYs 1977-79 and divides them by various simple indicators of 'output' to show relative costs; it also shows the average number of staffweeks spent annually in this period on supervision per project under active supervision (i.e., receiving more than one staffweek of supervision effort). The table clearly demonstrates that the average expenditure of staff-time per project is far higher for railways than for other transport modes, and that railway projects are in this sense the fourth most expensive type of Bank-assisted project as regards preparation/appraisal, and third most expensive in respect of supervision. They are slightly above the overall average for the very large number of projects in Agriculture and Rural Development. Railway projects took an average of 148 staffweeks for preparation and appraisal (through presentation to the Executive Directors), and then 18.3 staffweeks per year for supervision.

5.05 Measured against the dollar indicators, however, railway projects have been much less expensive compared to projects in other sectors. Indeed, in terms of staffweeks spent per dollar of total external financing provided (column 7) and total project cost (column 9), railways are the fourth least expensive among the various types of projects. In terms of time spent per dollar of Bank/IDA commitments, railways, at 2.7 staffweeks per million dollars, are similar to other transport modes and constitute the median among all types of projects shown, slightly below the Bank-wide average. These reversals of the ordering of railway projects among other types of projects
5.09 Fourth, the effects of many of the most important reforms made with Bank assistance -- more slowly than targeted but quicker than without Bank involvement -- are such that they can often be only partially, if at all, reflected in short-term sub-projects' returns. The following list of achieved contributions by the Bank does not attempt to be comprehensive, but it illustrates their broad range in subjects and countries: staff reductions (Brazil, Indonesia, Mali), line closures (Yugoslavia, Thailand), service closures (Mexico, Senegal), basic planning capacities (India, Mexico, Yugoslavia), opening procurement sources (Ivory Coast, Pakistan), marketing (Malaysia, Spain, Thailand), costing and tariff structures (Algeria, Brazil, Taiwan, Tunisia), basic institutional structures (Korea, Senegal), new technologies (unit exchange maintenance system in India, wagon control in Mexico), improved traffic operating techniques (Bolivia, Pakistan, Spain), training arrangements (Cameroon, Sudan). Although most of these changes are not directly related to the investments financed by the Bank, so that their effects cannot be reflected in economic analysis of these investments, it is most unlikely that they could have been attained without the Bank's financial involvement. Yet, if traced through, they would be found to have substantial quantifiable benefits attached to them. Factors of these sorts are of course also present to varying extents in Bank operations in other sectors, but they appear to be particularly important in railways in view of the magnitude and difficulty of the structural transformation required.

5.10 Sometimes it is argued that, whatever the appearances, misinvestments and lags in reform would have been avoided at least as fully, and perhaps more so, if the Bank had refused to lend and the railway had been allowed to run up against absolute financial constraints, forcing investment cuts and economies. Where Governments were prepared to take a very hardline with their railways, this might be the case. But in the vast majority of borrowing countries, the railway organization itself is politically powerful and/or Governments, like many in the European countries, face very strong domestic political pressures not to press railway reform too hard. The combination of this with enhanced competition among manufacturing countries for exports, and the strength of the railway equipment manufacturing industry in these countries, means that, in the railways field, Bank refusal to lend would seldom have the postulated consequences.

5.11 Through its involvement in railways the Bank is also able to contribute to solving aspects of various macroeconomic problems which would be hard or impossible to cope with in any other way. The subsidies problem cannot normally be satisfactorily solved without significant rationalizations within the railway, and the Bank's own experience, especially in Africa, has demonstrated that emphasis on the financial aspect alone has sometimes resulted in attempts to solve the problem merely by tariff increases, to the neglect of important opportunities for cost savings; to minimize social costs of subsidy reduction, rationalization needs steady and persistent pursuit within the railway. Higher relative prices of energy make it more important than before for railways, as an energy-efficient mode for certain purposes, to become as efficient as possible in other respects so as to compete for
their full potential share of traffic. They will anyway be called upon to play a larger role as coal exploitation increases. But experience has also shown that the Bank has an important job to do in advising countries on the selection and design of economically worthwhile energy-saving railway projects. Increase of export earnings to improve the foreign exchange balance is a very high priority for many developing countries and, as pointed out in Chapter II, railways often have a particularly important role in efficient movement of foreign trade, whether because of its high bulk commodity content or because of the exceptional density of flows between production centers and border points.

5.12 Two externalities of railways work also need to be considered. Socio-political obstacles to railway rationalization may be so great in some countries that Bank involvement in railways may give rise to tensions between the Government and the Bank that spill over to render Bank assistance and advice in other fields more difficult and less acceptable. On the other hand the importance of railway rationalization and pricing among issues in the transport sector means that withdrawal from active assistance for the railways would not save all the time now devoted to railways work; projects in other transport modes often raise railway issues that need careful treatment. Especially in some of the African countries, the seriousness of the current highway maintenance problem stems in part from past failure of the railways to attract the share of traffic for which they should have been the best mode of transport.

Overall Assessment: Selectivity Needed

5.13 In sum, while over-optimism and misdiagnosis have occasionally led to projects from which the Bank might in retrospect better have been dissociated, the overall balance of evidence highlights more the significant and important contributions that the Bank has been able to make even in this very complex and difficult field. These contributions have been made at costs that have not been particularly high relative to Bank lending volume and that are low by comparison with the total volume of investment supported -- indeed probably too low given the complexity of the problems that needed to be solved. The possibility of success in appropriate conditions is amply demonstrated by the substantial cost reductions that the Bank has helped to bring about: the general pattern of unit cost reductions among Bank railway borrowers, particularly marked in many Asian and Latin American cases; widespread success in bringing down railway staff numbers; many gradual improvements in planning and costing procedures and practices; some significant progress in reducing uneconomic services and lines, and in improving traffic organization and operations management; and some strengthening of rolling stock maintenance. Much weaker areas have been the technically and organizationally complex problem of motive power maintenance, the matter of traffic development and marketing, requiring changes in attitudes and philosophies, and overall financial performance, highly dependent on Government actions; but even in these areas there have been some important partial successes as in Korea especially, and in other countries, such as Bolivia, Brazil and Malaysia, in particular respects. In many countries Bank urging has certainly helped to improve financial performance over what it would otherwise have been.
5.14 Moreover, with more selectivity and focus in the Bank's railway operations, it should be possible substantially to improve on these results, even though the pace of change in borrowers' railways will often be slow given the vested interests arrayed against reform. Recognizing the political and administrative constraints that apply in a country, the Bank should always be working at the margin, pressing for the greatest pace of progress of which the railway is capable. This paper sets out more clearly and fully than has been done before the Bank's view of the railways problem and it should be used in part as a screening device. Governments and railways not interested in the kind of structural transformation that this paper propounds would look elsewhere for assistance in this particular field; it is to be expected in fact that some countries for which railway loans are presently envisaged in coming years may not wish for now to pursue the possibility further. The review of experience contained in the paper also suggests much more precise and comprehensive measures than have often been applied in past Bank loans for dealing with the most difficult problem areas, especially those listed at the end of the last paragraph. These approaches must now be applied wherever needed.

Diagnosis and Preparation

5.15 The first condition for successful Bank assistance is a correct diagnosis of the broad economic potential of the railway, of the most important problems to be solved at that particular juncture in the railway's transformation, and of the problems which the Bank can most effectively help solve. This requires on the one hand a sound understanding of the evolving economic structure and economic geography of the country, which may need to be based on the kind of perspective study discussed at the end of Chapter II, and a more detailed analysis of the particular routes and commodities for which near-term investment is envisaged. On the other hand, it requires experienced judgment: to determine how many problems the railway has the management strength to resolve in the near term; to select among the various problems confronting the railway those that should be attacked; to deepen understanding of the specific obstacles to solution of these problems and identify remedial measures; and to formulate an appropriate package of efforts and actions. And it requires patience and diplomacy to win agreement and conviction among railway, Government and Bank for the specific program's objectives and content.

5.16 Thus railway projects need considerable preparation, but often not so much in the sense of engineering drawings as in broader areas. Certainly major civil works, such as large track realignments or major bridge works, need to be brought to the stage of final engineering by the time a loan would be approved, in accordance with modern Bank standards, and workshop expansion plans need much fuller preparation than in the past, as noted in para. 3.26.

5.17 But other broader preparatory studies may be more numerous and more lengthy: for instance, depending on the particular problems of the railway, staff inventories to identify specific training requirements, excess personnel and gaps to be filled by technical assistance; assessment of
existing management information generation, distribution and use, and of the
specific next steps to be taken in strengthening costing and tariff
formulation; deeper marketing analysis of traffics to be affected by
envisaged investments; detailed technical review of the state of locomotives
to enable more realistic assessment of future availabilities and measures
necessary to improve them; study of the railway's obligations for retirement
benefits and pensions to excess staff who have been or should be retired, and
of how these obligations should be met in future; financial sensitivity
analyses to see what measures might be taken to maintain project progress and
efficient railway operation in the event of revenue shortfalls; preparation
of specific programs for reduction of subsidies or reduction of costs, with
pin-pointed targets as to the locus and amount of reduction to be expected
each year and listing of the steps necessary to reach those targets; etc.
Such preparatory studies, although considerably more extensive than required
in the past, will normally be an essential basis for putting together a sound
Action Plan that is more than a mere list of standard indicators.

Government Commitment

5.18 As preparation moves ahead from initial diagnosis of potential and
problems, and identification of a possible project for Bank support, it is
essential for the Bank to obtain and periodically confirm the full commitment
of the Government, as well as of the railway's top management, to the
objectives and solutions emerging. Lack of Government commitment to the
basic objective discussed in this report, of gradually creating a
commercially viable railway actively competing with other modes of transport,
has on occasion been a serious problem in the past, manifesting itself after
a loan was made, in the form of major new impositions on railway management
or initiation of large new line construction without adequate feasibility
studies. Changing degrees of commitment are of course to be expected, as
Governments and their policies change and as the forces resistant to reform
of the railway make themselves felt. Some of the changes in attitudes and
philosophy involved in transforming a railway from a social service into a
commercial enterprise may take major public education. But if Government and
Bank do not reach and maintain agreement on the broad thrust and objectives
of the diagnosis, or on the main lines of the specific programs prepared, it
may be best for the Bank to seek other sectors in which to assist development
in the country.

5.19 The strength of commitment by the railway itself and the Government
is generally enhanced and developed, the more of the preparatory studies that
they do themselves. Clearly it is desirable for as much of this work as
possible to be done by their staff and domestic consultants, following terms
of reference agreed with the Bank, even at some sacrifice in technical
quality. The Bank has increasingly used this approach wherever possible, and
experience suggests that what is lost in technical quality by not using more
experienced consultants from overseas is often made up by deeper
understanding of the local situation and by fuller commitment to
implementation of the results.
5.20 While key commitments at different stages in development of a project are often usefully recorded in memoranda of understanding between Government and Bank, the main indicator of Government commitment must be actual actions, such as the quality of management appointed to the railway and the support Government gives to that management. In view of the difficulties encountered in the past with regard to the extent of Governments' real commitment to railway reform it would seem appropriate for the Bank to require in the future, as preconditions for finally making a loan, the start of action, rather than statements of intent, in the three critical areas identified at the end of Chapter IV: more realistic costing and taxation, and reduced regulation, of competing modes; closure of uneconomic lines and services; and increase of railway management's freedom in matters such as tariffs, salaries and budgets. These are such critical dimensions of the whole structural change process that unless Government feels sufficiently committed to them to make a start on any necessary measures, for instance by approving closure of some of the most clearly uneconomic operations and corresponding reduction of staff, it must remain doubtful whether it is worth embarking on the project to be assisted by the Bank.

**Bank Commitment**

5.21 Besides commitment by the Government and its railway to the concept and objectives of a reform program, the Bank itself needs to recognize, in embarking upon preparation of a railway project, that it is undertaking a job that is likely to require much more than one loan to bring to fruition and that will probably be slow and time-consuming. It is clear from this review that the agenda of needed change in most railways is long and that a single loan can usually only be one step in the process, with foci appropriate at that particular juncture. With further progress, other issues will need to be taken up, and the corresponding preparatory studies carried out. Moreover, a single loan is likely to be administratively exceptionally expensive; time recording data bring out clearly the substantial minimum amount of staff-time that needs to be spent annually on a railway as long as the Bank remains associated with it, from the beginning of project preparation to completion of supervision.

5.22 Thus the last main condition for success of railway projects is a high degree of commitment by Bank management, in terms of their own personal involvement and in terms of the staff resources attributed, both over a long period. There would appear in particular to be need for greater field involvement of senior Regional management and Country Programs staff. Structural reform often raises difficult political issues, some of the considerations that are relevant — especially in the area of financial performance — extend well beyond the disciplines included in a normal railways mission, and one of the most important functions of the Bank is to persuade the Government of the need for strong reform-oriented management appointments and then to assist the management in convincing Government that the time 'has come for action on specific reform steps such as closing certain services and adding to the railways' freedoms. The momentum of reform has to
be sustained, and the weight of senior Bank staff can be critical in helping to carry conviction with Government and to secure action. The issues that railways raise are sometimes sufficiently difficult and important that they need to be treated within the context of the Bank's overall lending program and relations with a country. Heavier involvement of senior Department staff in selection of objectives and project preparation will also lay the foundation for easier agreement within the Bank at later stages when firm stands are called for, such as holding up approval of a loan or of disbursements under it or terminating new commitments.

5.23 Large quantities of the time of railways specialists, sometimes supplemented by country economists on aspects such as labor issues, fiscal dimensions and traffic forecasting, will also be needed not only for appraisal but also for the successive rounds of preparation and supervision of overlapping projects. Programs of institutional and policy reform need to be supervised closely. Agreed Action Plans and Subsidy Reduction Programs, and the measures underlying them, require detailed follow-up, as much by engineers and economists as by financial analysts. The experience reviewed in this paper also shows that such tools have essentially short-term value, and that the targets they establish, as well as overall financial targets, will frequently need revision in light of unexpected outside events if they are to remain realistic and useful. Physical components of projects also need careful follow-up; the project performance audits bring out a number of cases, in a variety of past railway loans, where changes in planned project expenditures were approved with too little economic analysis, and a few cases where delays that had occurred in procurement could have been put to better use to avoid expenditures that had ceased to be of high priority; closer review during project supervision could have improved the economic impact of the Bank's loan.

VI. Future of Bank Railway Operations

6.01 The preceding chapters have demonstrated that the railway mode has the potential for a major contribution to development and an important future, but that to achieve this potential requires changes in existing railway enterprises that amount to structural transformation. Regulatory policies, the concept of financial responsibility, incentive systems, pricing and marketing approaches, staff development arrangements, as well as the network itself and the services operated on it have to evolve in directions appropriate to a situation where customers are service-conscious and railways compete actively with other modes of transport. Changes of structure and attitude necessarily take time, additionally so when they run counter to important acquired interests. Physical investment, carefully planned and selective, is essential to adapt the service better to customer requirements, but it is only one component, and efficiency in operation and maintenance of investments once made has typically been a more difficult problem than efficiency of investment execution or procurement. Human capacities need to
be built in management, modern maintenance, inventory operation, staff training, marketing, costing and operations control. The job is, more than in most fields, an institution-building one, and hence one in which the Bank could be expected by its member-countries to make an important contribution.

Coming Transport Needs

6.02 The importance of such an effort results from the very large transport requirements that development poses. The figures for 1966-76 given in Table I.1 (in Annex I), covering five developing and five industrialized countries, illustrate the issue well. Average annual growth of both freight and passenger traffic (all modes) in the five developing countries listed was well over double the comparable growth in the five more developed countries: 9.1% against 3.9% p.a. for freight over the ten-year period, and 11.2% against 4.9% p.a. for passengers (unweighted averages). The differences result from higher rates of growth of GNP in the developing countries, the common tendency for freight movements to expand more rapidly than GNP during early stages of development, higher population growth rate, and much higher income-elasticity of demand for travel at low than at high income levels. High growth of transport requirements, combined with the significance of transport facilities in a nation's total capital stock (usually estimated around 20-25% in developed market-economy countries, for example), make it very important to meet transport requirements as economically as possible. Where railways can do the job more efficiently than other modes they must be exploited to the maximum.

6.03 Rising prices of energy may of course directly reduce total transport requirements somewhat, as people eliminate less important trips and productive enterprises adjust location and distribution patterns, but the effect is not going to be dramatic. The point can be illustrated with passenger travel. In low-income countries households spend about 9 to 10% of their incomes directly on transport, and the income-elasticity of household direct demand (i.e., mainly for passenger transport) is calculated to be 2.5, the highest of all main categories.⁹/ The price elasticity of household demand is about 0.5.¹⁰/ Fuel is about one-fifth of the total cost of transport. If the real price of fuel doubled recent levels to reach (in 1980 dollars) US$50/barrel, the cost of motor fuel would increase by up to about 75%. Even leaving aside the certainty that important economies will be made in transport's use of fuel, the effect of such a price increase could only be to reduce total demand for passenger movement by some 7% (0.5 x 0.2 x 75%). This is equivalent to one year's normal growth of passenger demand if population is growing at 2% and per capita incomes at the same rate, or about one-and-one-half year's growth if incomes are growing only 1%. Under the same excessively conservative assumptions of no technological progress, a tripling of recent fuel price levels could lead at most to loss of twice these amounts of growth in demand for transport.

⁹/ Lluch, Powell and Williams, Patterns in Household Demand and Saving, Oxford 1978, Tables 3.11 and 3.12. The countries analyzed had average per capita GNP (in 1970 dollars) of US$167 (Table 3.2).

¹⁰/ Lluch, Powell and Williams, op. cit., Table 3.13.
6.04 The prospects for a country's rail traffic have of course to be examined in the context of that country, taking account of the various factors discussed in Chapter II. But an indicative, representative picture can be given assuming a 5% GNP growth rate and 2% population growth rate, and using the factors, based on the 1966-76 experience of a range of countries, discussed in paras. 2.10-2.16 and Annex I. Applying the overall income-elasticity of freight traffic growth that characterized the five developing countries would give a 5.6% growth of freight traffic (all modes). This in turn would imply about 3% growth of rail freight, assuming a continuation of the gradual shift away from rail identified in Chapter II -- and slightly higher if the railway acts to take advantage of the marketing opportunities opened by higher fuel prices. Under the same assumptions, passenger traffic (all modes) could be expected to grow about 7% p.a., but growth of rail passenger traffic might range anywhere from this level down to 0 or even negative, depending on the real suitability of passenger-flows in the country for rail transport and the adaptation of passenger services to needs.

6.05 These estimates are indicative of the prospects for a railway which has a definite economic role and which is steadily adjusting services to that role. The respective growths of freight and passenger traffics overall would likely reflect a combination of absolute decline in some traffic categories ill-suited to rail and comparatively high rates of increase of other categories to which the railway is adapting itself—coal and other heavy minerals, large movements of timber and grain, intermediate products in concentrated flows, containers carrying finished goods between main producing/consuming centers and ports, and passengers on individual densely travelled routes. Investments required are therefore likely to be heavily concentrated on provision of improved facilities, better service and more efficient operation (including electrification of particularly heavily trafficked routes) for these traffics.

6.06 The alternative to this picture is a stagnation or retrogression of overall traffic as even those categories of goods and passengers which could in principle move more efficiently by rail shift away to other modes, along with the traffic-categories that the railway will lose anyway. This is the prospect which will face, and in many cases is already facing, railways which cannot or will not make the structural transformation required by modern circumstances. In this case the best course is to hasten the decline of the railway and expedite the economy's adjustment to functioning without rail service. In some countries, as pointed out in Chapter II, this would represent the optimum solution because geography, economic structure and development of other modes leave the railway no useful role. In most countries that already have railways it would be a second best, burdening the economy with substantially higher costs than necessary for the perhaps 25-35% of its freight traffic and some 10-25% of passenger traffic which would continue to choose rail if efficient service were available. Moreover, during the period of decline, despite the large subsidies likely to be necessary as closures and withdrawals are gradually negotiated, serious bottlenecks would probably occur as the deteriorating railways prove unable to move traffic for which alternative services are not yet ready.
Focussing the Assistance Effort

6.07 Essential conditions for success of a Bank contribution to a railway's development—sound initial diagnosis, thorough project preparation and full commitment by both the recipient country Government and the Bank itself—were derived from past history in the preceding chapter. Part of the purpose of the initial broad diagnosis is to select correctly the much narrower focus that a loan and project must have in order to be most effective. Selecting and defining appropriate areas of concentration in a railway loan is not easy, due to the system nature of railways' operations and the high degree of interdependence among them. Track may be satisfactorily improved (including all aspects such as rails, ballast and bridges), but unless rolling stock is maintained and operated efficiently the results may be disappointing. Workshops may be upgraded, and even if all ancillary aspects of their operation are satisfactorily dealt with (including spare parts supply and staff availability), the effect on operations may still be very limited as a result of line problems or traffic shortfalls. The impact of projects has often been diminished by unexpected deterioration in areas interdependent with items chosen for project focus; it has suffered even from shortfalls in Government action in areas quite outside the railway itself such as arrangements for exploitation of forestry resources which were to provide the traffic. Yet the deeper that it is necessary to go into a variety of aspects in one area, the more difficult it will be to deal with complementary areas of the railways' operations without dispersing managerial attention over too many subjects.

6.08 The standard Bank-assisted railway project has consisted of a time-slice of the national railways investment program, either including virtually all envisaged investments or a priority subset of those for which other foreign assistance has not been obtained. Bank projects have therefore normally had many components, in track improvement, workshops construction and equipment, procurement of locomotives, purchase of parts for local assembly of rolling stock, station and marshalling yard improvements, signalling and telecommunications, procurement of maintenance equipment, etc.; studies and technical assistance may cover other areas; and loan covenants yet further aspects. The time-slice used has been typically two-three years, but projects have often turned out to take considerably longer than expected to execute. This, together with delays to further lending due to disagreements that developed between Government and Bank in a few cases, especially on choice of new investment, is the main reason why, even with 25 active borrowers, the Bank has only been making about 5 railway loans a year compared with the 9-12 that would occur if two/three-year time-slices were regularly succeeding one another.

6.09 The fact that a project has many components does not necessarily mean that it has many foci, dispersing Bank or borrower attention over too many areas. Some of the components may be expected to proceed very smoothly, and some of them may be financed by other lenders in the fairly frequent projects carrying extensive co-financing. The Action Plan and covenants can still be appropriately focussed on a few key matters. But recent years have
seen efforts to move away from time-slice financing in a number of cases. Projects have been designed to concentrate entirely on the upgrading of a single particularly important line and provision of ancillary facilities and rolling stock for it, on modernization of workshops or manufacturing facilities, on improved execution of a particular function such as transport of fertilizer, on comprehensive improvement in a particular region or sub-region. In addition, the financial performance of railways, as of other public-sector enterprises, is identified as one of the targets in some of the Bank's recent general Structural Adjustment Loans.

6.10 Each of these approaches can be appropriate in different circumstances, depending on the importance to the national economy of the particular area of concentration chosen, and the variety and depth of problems involved there, on the one hand, and the adequacy and operating efficiency of other existing facilities with which the new investments will be interdependent, on the other. General Structural Adjustment Loans would not normally on their own help railways very much, because intensive assistance is required with the internal institutional and technical change that must accompany financial reform. But they could be invaluable complements to railway loans, particularly on broader issues such as subsidy reduction, improvement of wage and salary structures, and changes in managerial and financial policies. Loans for the other partial types of project normally need to carry financial covenants relating to the whole railway system which will ensure sufficient cash-flow for railway operations and project execution to proceed smoothly.

6.11 However, in using these approaches it is also extremely important to verify that any other significant investment underway or planned in the railway system is economically viable, and that serious measures are being taken to achieve any service closures, disinvestments or personnel reductions needed in other parts of the network. If these conditions are not fulfilled, the Bank has to ask itself very serious questions as to whether its financing is really enabling not the investment to which its funds are nominally attached but the other uneconomic works going on simultaneously, and as to whether it is not facilitating postponement of economies needed elsewhere in the system. The answers can only be given on the basis of case-by-case investigation. There are a few cases, for example, where uneconomic lines are heavily concentrated in particular disadvantaged regions, and their closure cannot be effectively pursued in the railways context; the solution must come rather as part of an overall reform of central Government transfers to that region, to increase their real contribution to development.

11/ And also to find other ways of enabling fuller concentration of attention on key issues. For instance, to avoid large diversion of staff time to procurement issues, it is sometimes desirable to exclude from Bank financing very specialized equipment, such as snow-plows, with which Bank staff are little familiar, and locomotives for which effective international competitive bidding has to be very carefully done (see para. 3.24 and Annex III). The possibility of this depends of course on satisfactory alternative, usually bilateral, arrangements being made. One of the advantages of railway lending is that railway requirements usually include a large number of items for which international competitive bidding is quite easy and usually very advantageous. But procurement arrangements may still need considerable attention, for instance in cases where railways have previously been burdened with much high-cost local purchases under "buy national" rules.
Regional Projects and Sector Lending

6.12 The most promising of these newer approaches, departing from the 'national time-slice', may be the regional one, especially for very large railway systems which are difficult for a Bank team to handle properly without an inordinate expenditure of time. The situations of the borrowing railways regarding need for increasing centralization or decentralization vary greatly, depending on past history, culture and technological stage reached. However, as noted in Annex II, clear evidence exists of the administrative and bureaucratic complexity of large organization outweighing technical scale-economies in railways at a size low enough to recommend considerable decentralization to levels below the national in many of the larger countries assisted by the Bank.

6.13 It may be a question of a portion of the national railway serving a region isolated by water or by other geographical obstacles, or simply the product of railway history, provided that it is not a case of a regional system partly duplicated by others. For the region to be suitable for a Bank loan its accounts and management information would of course have to be separable from those of the rest of the network. Insofar as needed management reforms -- such as delegation of responsibilities, information systems improvement, costing, marketing -- cannot usually be effectively introduced simultaneously over a very large system, for lack of trained manpower, it may be highly appropriate to concentrate them first in an area where the railway has particular importance and potential. The Bank may be able to finance a higher percentage of such a regional project than would be possible for a larger national project, and this can give its advice more weight. The frequent tendency for country effort, in any sector, to concentrate even more than intended on a project assisted by the Bank, at the expense of other projects, would not be economically disadvantageous in the case of many railway systems. In other cases the initial region of concentration might serve as a demonstration, for emulation in early follow-up projects for other regions.

6.14 Throughout its railway lending the Bank should continue to foster the development of better investment planning capabilities among its borrowers. Many of the more experienced railway borrowers now do the main work of technical, economic and financial preparation and evaluation of investment schemes themselves (or with the assistance of domestic consultant firms) and the analyses are reviewed by Bank staff during project preparation and elaborated where necessary to answer questions raised. For the larger railways, with very complex investment programs, such reviews can only be done on a sample basis. To date the sample has tended to consist mainly of particular sub-projects envisaged for Bank assistance and presentation in the Bank's appraisal report, but it would clearly be desirable to shift to a more general basis. There has been some move in this direction, and a few loans have also provided some flexibility by including, in addition to an 'A' list of already approved and agreed sub-projects, also a 'B' list of schemes needing further investigation and analysis by the borrower, that could be partially funded by the Bank if they prove promising.
6.15 A further development in this direction would be to move to 'sector loans', of the type developed in the 1970s for highways lending, once borrowers have established reasonably strong internal planning capabilities. Under such 'sector loan' arrangements Bank and borrower agree during preparation and appraisal on the general size and pattern of the borrower's investment program, the sub-project evaluation procedures that will be applied and the economic and technical criteria that sub-projects must meet, the procurement procedures to be used in the cases where Bank assistance is used, and the details of any specific programs of institutional or policy reform required. Thus the particular sub-projects that will be supported by the Bank funds do not need all to be ready, or even identified, at the time of Bank appraisal of the project, but can be submitted for Bank approval later or, in the case of smaller items, can automatically become eligible for Bank support by following the agreed preparation procedures and criteria. These arrangements have been found to have several advantages for highway loans to larger countries, in the form of greater flexibility, more even work-flow and better possibility of appropriate focus on broad sector policy issues at appraisal and in major annual reviews.

6.16 Under past railway time-slice loans, each with components fully specified at the time of appraisal, changes have of course sometimes been made later in order to adapt the investment to changing circumstances. But, because procedures were not built into the loan and the Bank's planning from the beginning, changes in loan allocations were sometimes made with less scrutiny or less frequently than desirable, as noted in para 5.23, and performance targets were not normally adjusted. Once or twice initiatives were taken by the Bank to try to expedite important decisions on policy matters—by delaying approval of contract award for a particular sub-project, but that practice has been found questionable by the Bank's General Counsel; again, the flexibility characteristic of highways-type sector lending, under which approval of sub-projects can indeed be relaxed to progress on agreed policy issues, was missing.

6.17 Another form of sector lending that could be envisaged, perhaps truer to the name and potentially more effective where issues of transport sector policy and inter-modal competition were of overriding importance, might possibly be "transport sector loans", including components for both roads and railways and perhaps other modes and ancillary facilities. Largely because of the unusual importance of these very issues in one recent case, the Bank did make a project loan with components in both railway and highway fields, and including provision for special studies to be undertaken on the factors that should be taken into account in shippers' modal-choice decisions and ways to improve such decision-making. This "transport project" formula may be particularly suitable for smaller, poorer countries, where assistance is needed both on the traditional project preparation and implementation issues and on reforms in broader transport sector policies such as regulation, taxation and pricing in the different modes; it could give more weight to the reforms sought by the Bank and should yield some minor staff economies compared with two separate loans. For larger countries, with more developed capabilities on project planning, bidding and procurement, construction and technical operation, a transport sector loan could be more
appropriate, combining the flexibilities characteristic of highway sector lending, regarding works to be financed, with agreed studies and programs of reform in areas of transport sector policy.

**Sequencing of Lending**

6.18 Thus it would appear that normal practice with regard to railway lending should be to start a new borrower with a relatively small and limited project-type loan, for railways alone or possibly for other transport modes too, that can indeed be largely disbursed over a two- or at most three-year period. Provided that progress is made on all major dimensions of its objectives, this would be followed up with one or two larger two/three-year operations. Such loans might take either the traditional time-slice form, or one of the more varied forms mentioned in para. 6.09 provided that the key railway considerations of interdependence with the rest of the system, viability of non-project investments and progress on disinvestment are fully covered. With the growth of their own planning and project-implementing capacities, borrowers could be moved to the more flexible sector format requiring less frequent appraisal work but considerable supervision responsibilities for the Bank. This might take the form of either railway, or possibly even broader transport, sector lending, depending on the scope of key improvements needed. The objective of moving as early as possible to sector lending means that even greater emphasis than in the past needs to be given from the start of association with the borrower to building up its own investment planning and evaluation capacities. Also, all loans, of whatever type, would be based on the more elaborate diagnostic and preparatory steps described in paras. 5.15-5.20.

6.19 The effort required to prepare and follow up more detailed and focussed Action Plans, cost reduction programs, staff and equipment inventories and assessments, marketing studies, and sub-project feasibility and engineering studies should come as much as possible from the borrowing railway and Government, supplemented as necessary by domestic consultants. As mentioned, even some sacrifice of quality should be accepted in the interests of better understanding of the local situation, fuller commitment and valuable staff training. But the level of expertise available in many of the borrowing railways is still such that foreign consultants will continue to have to be used to a large extent, financed under preceding loans or out of the Bank's Project Preparation Facility; many railways around the world, including some of the Bank's borrowers, have now set up consulting subsidiaries which can draw flexibly on the full range of technical expertise available in the organizations which own them, and many of these firms have been involved in Bank projects. The quality of a project depends above all on the effort devoted to it by staff and consultants under the borrower's own control.

6.20 While it is important, and perhaps particularly so in initial loans to a country's railway system, to set cautious targets for improvement of operating efficiency and to err on the conservative side with regard to revenue prospects, the Bank must insist on evidence of progress under earlier loans in order to warrant follow-on ones. Outside events can of course cause
set-backs, from which time must be allowed for recovery, and it is partly because of this need for recalibration of targets that it is particularly desirable for early projects to be physically accomplishable in short periods, of say two-and-a-half or three years, towards the end of which new targets will be established in connection with the succeeding loan. But progress must be made. Improvements in financial performance are no less important than improvements on technical and institutional aspects since there is no effective alternative to customers' demonstration of their readiness to pay for services rendered as an indicator of benefits in a market as complex as that for transport services. Improvement in technical indicators alone can even be misleading, for instance if technical efficiency increases in areas where customers would make alternative arrangements once they began to be charged prices based on marginal costs.

6.21 Moreover the Bank must continue to attach exceptional importance to significant railway investments undertaken by the borrower or Government, outside the agreed investment plan, being economically sound. Loan Agreements must as a minimum require that major alterations in the agreed investment plan or significant additional investments will not be undertaken before their worth has been demonstrated by adequate feasibility studies. Because of the technical difficulties of railway investment planning and the pressures to which decision-makers get subjected, many railway borrowers of the last few years have been pleased to include in their Loan Agreements with the Bank a requirement for Bank concurrence to be obtained to such changes. Whether a concurrence clause, or the frequently less useful clause requiring only consultation with the Bank, is used, it is very important for the Bank to have the capacity to respond quickly and well to requests for its judgment on studies submitted regarding such additional investments. It is also vital to the effectiveness of its overall role in railway reform that the Bank take a firm stand if significant uneconomic investments are embarked upon in the railways field in a country where the Bank is lending for railways. This will mean suspending processing of follow-on loans and, if existing loan covenants have been breached, suspension of commitments or disbursements on such loans.

Conclusion

6.22 The continuing importance of railways in modern transport, the macro-economic significance of the issues that they raise and the capacity that the Bank has shown to assist in the very difficult transformation required, strongly argue for further Bank effort in this field, more selective, but also somewhat more intensive for railways which are selected. Selectivity implies a set of minimum criteria for the acceptability of future railway loans. These may now be explicitly summarized:

(i) Clear and well-defined future economic role for the railway, reflected in carefully prepared and realistic traffic forecasts;

(ii) Agreement with Government that the basic objective is a commercial operation of the railway, in active competition with other modes of transport;
(iii) A start on any required Governmental actions (which will of course depend on project and country circumstances) for improving the functioning of the transport market (e.g., reduced regulation, appropriate taxation), permitting closure of uneconomic lines and services, and increasing freedom of railway management;

(iv) A start on any required Railway action which will again depend on country and project circumstances on internal reforms needed in respect of management, planning, marketing, costing;

(v) Adequate definition of the Railways' Investment Plan and absence of any significant uneconomic investments;

(vi) Availability of substantially completed engineering designs and adequately prepared operational Action Plans covering key problem areas selected for near-term action.

These requirements differ from what was done in the past in that they have not all been applied to every project, and statements of intent rather than the beginning of action have often been accepted in respect of (iii) and (iv). Nonetheless they are being largely met by a number of current borrowers, and are also yielding railway financial results reasonably consistent with the recommendations of this paper.

6.23 The Bank should be prepared to further increase its effort in the railways field if additional member countries for which loans are not now envisaged, demonstrate interest in, and commitment to, the kind of gradual structural transformation outlined in this paper. In cases where, on the contrary, socio-political obstacles make it impossible for a Government to envisage transformation of the railways into a competitive transport enterprise, the Bank should concentrate its own effort in transport on the other modes.

6.24 This report should be used as the basis for discussion of railway issues with the Governments of borrowing countries, and the Bank should also organize a review of it with other organizations and agencies lending for railways in the developing world. If elaborations and revisions seem appropriate following a series of such discussions with borrowers and other lenders, a second edition should be prepared.
ANNEX I
THE CHANGING ROLE OF RAILWAYS

I.01 The particular difficulty of accurately forecasting railway traffic in the last thirty years resides in the fact that the railway has been becoming a more specialized and limited-purpose mode of transport, due to technological and infrastructural development in other modes and change in the structures of countries' economies and economic geographies. The railways have been squeezed between the increasing claims of pipelines and coastal shipping for long hauls and of road transport for shorter hauls, and between the declining importance of heavy bulk movements in some developed countries and the increasing dispersion of agricultural and manufacturing production in some developing countries. The forecasting difficulties and errors have been far from confined to the developing countries. Almost all railways have lost traffic to other modes, and generally more than expected.

I.02 The faster the rate of economic growth in a country the bigger the fall in the railways' share of total freight movement has often been. This emerges strikingly from the data assembled in Table I.1 which attempts to capture the main changes in overall transport patterns and railway role in a variety of countries, half borrowers and half industrialized, for which reasonable estimates can be made over the ten years 1966-76. The table reflects enormous diversity among countries, little related to degree of economic development, particularly as regards the importance of overall freight transport in the economy (column v), the relative role of railways in freight and passenger movements (columns ix and xi respectively), and the railways' own traffic structures (column xiii). But comparison of columns (i) and (viii)/(ix) shows surprisingly strong relationship for this period between pace of economic growth and decline in railways share of freight movements. Leaving aside Brazil, the three fastest growing countries (8-10% p.a.) show an average percentage fall in rail share between 1966 and 1976 of 53%, the three middle growers (5-7% p.a.) show an average fall of 27%, and the three low growers (2-4.5%) an average fall of 14%. Absolute growth of rail freight has been negative only in Japan but it has not exceeded 2% p.a. except in one of the fast developing group (Korea: 6% p.a.) and one of the relatively slow developing group (USSR: 5% p.a.).

1/ While the omission of intra-urban freight movements in the Brazilian figures exaggerates the difference with the other countries, it is probably true that Brazil represents an exception to the general finding presented insofar as large increases in minerals traffic, largely for export, have been an important dimension of that country's fast growth.
### Table I.1

**GROWTH OF FREIGHT AND PASSENGER TRAFFIC (ALL MODES) AND CHANGING ECONOMIC ROLE OF RAILWAY: SELECTED COUNTRIES 1966-76**

<table>
<thead>
<tr>
<th>Country</th>
<th>1966 (i)</th>
<th>1976 (vi)</th>
<th>Share of Rail (vii)</th>
<th>Structure of Railway Traffic (viii)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rates of Growth 1966-76</td>
<td>Freight Transport per capita</td>
<td>Freight Transport Pss. Transport</td>
<td>(i) (xii)</td>
</tr>
<tr>
<td></td>
<td>(GDP) (All Modes) (v)</td>
<td>(GDP) (All Modes) (vi)</td>
<td>(GDP) (All Modes) (vii)</td>
<td>(GDP) (All Modes) (viii)</td>
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<td>1.7</td>
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<td>1.4</td>
<td>1.4</td>
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<td>11.6</td>
<td>1.0</td>
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</tr>
<tr>
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<td>13.3*</td>
<td>4.5*</td>
<td>4.5*</td>
</tr>
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<td>3.7*</td>
<td>3.9*</td>
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</tbody>
</table>

*Inter-city Transport only, whereas figures for other countries include urban transport.

**a)** i.e. ratio of total ton-kilometers of freight movement all modes to GDP measured in 1967-69 US dollars, with conversions at official exchange rates.

**b)** for the principal national railway except in the case of USA where the figures refer to all Class I Railroads summed.

Sources: World Bank data for GDP, GNP, population. National statistical publications and World Bank project reports for the transport data. The basis of the figures ranges from official statistics as in the case of Great Britain, Yugoslavia and USSR to estimation and extrapolation on the basis of partial official statistics as in the case of Pakistan, China and France.
The common tendency for railways' role in overall freight transport to have fallen in this period -- and the faster the quicker overall economic development -- is additionally striking because of the very different transport policy principles favored in the different countries, ranging from strict control, and limited investment, in roads and road transport in the USSR to virtually a free market in freight transport, with extensive competing networks, in Great Britain. Yet uniformity in this respect is entirely consistent with the conclusions of a series of past studies which have tended to find that Government regulation of rail and trucking operations and prices have done little to prevent the diversion of freight traffic to road, in part because of the great difficulties of effectively regulating or limiting "own-account" trucks, which are then easily used for transport on account of others too. A critical finding in one of the more recent studies of this nature was that modal splits in Australia, after abolition of Government control of interstate rates, are not significantly different from those for hauls of similar length in the U.S., with extensive regulation by the U.S. Interstate Commerce Commission. It is probable, on the other hand, that excessively limited investment in roads and trucking may be a significant constraint to overall economic development, as is apparently believed by many Soviet specialists for their own country.

The patterns of development with regard to rail transport of passengers have been more variegated among the countries. Rail has lost share in all countries. Outside East Asia this loss has been considerably greater than in the case of freight. In four countries (U.S., Brazil, Yugoslavia, Great Britain) it has been great enough to more than offset generally high rates of increase in passenger travel (all modes), so that rail passenger traffic has actually fallen in absolute terms over the ten-year period. But, in the three densely populated East Asian countries, rail's loss of share in passengers has been less than for freight in this period; these railways which, by comparison with the others, were predominantly passenger carriers in 1966 have generally become more so. This growth of rail passenger transport has been linked with comparatively high taxation of private cars and/or significant rail service improvements which have however been generally financially remunerative.

Determinants of Railway Traffic

The widely varying figures shown in Table I.1 for rail's share of freight and of passenger movements in the different countries in 1976 are

2/ Herbert O. Whitten Associates, for U.S. D.O.T., "Foreign Regulatory Experiments: Implications for U.S." (November 1977). The studies of the other countries covered (UK, France, Germany, Japan and Canada) reached very similar broad conclusions, but the particular relevance of the Australian experiences to U.S. conditions enabled a very thorough comparison on the effects of rate regulation.
certainly likely to change further, but many of the major differences can be largely explained in terms of three basic determinants of a country's railway traffic: economic structure (the types and quantities of commodities and services produced and consumed), economic geography (distances and degree of concentration of points of origin and destination) and transport technology (especially the degree of adaptation of the railway network and technology— and of the manner in which they are operated — to the traffics available, and the level of development of other modes of transport). Rail's very high share of freight movements in the USSR, which accounts for slightly more than 10% of world rail mileage but more than 50% of world rail traffic, stems mainly from the combination of heavy industry's exceptionally large part in the economic structure and vast distances over fairly flat landlocked terrain between raw material sources and centers of manufacturing and consumption. The highest rail share of passenger transport is in Japan, largely due to the Shinkansen with its 300,000 passengers per day (and around 1 million on peak days), representing very well adapted technology for the particular situation of an extremely densely developed industrial/commercial corridor. The very low shares of rail in freight movements in Japan and Great Britain reflect advanced economies, short inland distances and largely imported raw materials, while the exceptionally low rail shares of passengers in Brazil and USA reflect highly developed inter-city air and road services (cars and buses) and large, thinly populated countries.

I.06 Basic raw materials such as coal and mineral ores loom large in the operation of the majority of railway systems; coal alone often accounts for 30% or more of many national networks' total traffic. In movements of these goods railways have generally been able to hold their own against other modes, or even to increase their share. Nonetheless these commodities have presented serious forecasting problems. One difficulty was the gradual change in many countries to liquid fuels, which caused total coal consumption and traffic to fall substantially over the last two decades. Several Bank-assisted railway projects have suffered from unexpected difficulties and delays in commissioning new mines or increasing/maintaining production at existing ones. Another set of difficulties arises from the fact that the relationship between production/consumption and transport requirements often alters substantially due to geographical/technical factors such as changing balance between domestic production and imports, increasing consumption by minehead power-plants and other industries close to mines, reduced household use of coal, beneficiation/pelletization of mineral ores, growth of steel-making capacity at coastal locations, etc. Thus, for example, while domestic production of coal was increasing in Yugoslavia, movements fell, causing overall rail traffic to fall repeatedly below forecasts.

I.07 A large category of traffic where railways generally have a far more limited long-term role is general agricultural and manufactured products. Economic development tends to mean increasing local and regional production of these goods and/or increasing differentiation among particular
styles or modes of product. The first trend makes for shorter hauls, and the second for smaller consignments, both tendencies favoring flexible, rapid, door-to-door truck service, with its lesser packaging and lower inventory requirements. Korean Railways' share of movements in these two commodity groups fell from about a third of the national total in 1965 to ten percent just ten years later; the rail part of the traffic increased even in ton-kilometer terms only about 1% a year despite the very high growth of the economy. British Rail's share of total transport of goods in these two groups is now below 1%. A close analysis of the 1972 transportation census suggests that in the United States shipment size, rather than distance, is the key factor determining whether manufactured goods will be sent by road or by rail; almost all shipments of less than 60,000 lbs are sent by truck, at least up to 2,500 kms. Less adequate highways and lower labor costs for handling transfers of goods will prevent this applying to the same extent in developing countries. However, there too, railways' share in these traffics can be expected to be more and more confined to large consignments, for instance for export/import movement to and from ports or in trainloads for onward movement beyond a land frontier.

I.08 Between these two categories of freight traffic in which railways have respectively a major and a limited role lies a broad middle ground, largely consisting of intermediate goods like cement, fertilizer, edible oils, food-grains, bulk chemicals, bulk steel goods, oil products, and automobile parts. Rail's share of these can be important, depending mainly on the extent to which the volumes and patterns of production and trade give rise to large concentrated flows and on the degree of adaptation of railway service, infrastructure and wagons to the particular requirements of the trade.

I.09 Production plants for many of these goods tend to exhibit considerable economies of scale, requiring dense flows of inputs and sometimes of outputs, while in other cases the production and distribution process gives rise to very substantial transfers between plants, or from plants to regional distribution centers and large industrial consumers. In some countries, some of these goods indicate growing average length of haul (all modes) over time, presumably reflecting technological trends to increasing scale economies in production and growing regional specialization. While trucks are likely to handle any distribution to small scattered plants or traders, the denser flows can be very appropriate for rail movement. Except where size of flows or proximity to water have been such as to warrant creation of dedicated systems (e.g., oil pipelines, often

justified when flows of a given oil product reach 500,000-1,000,000 tons p.a., or coastal tankers or oil barges), railways have lost relatively small parts of their shares in these commodity groups and in some cases they have been able to increase their shares as a result of changing production/distribution patterns and better adaptation of their services to shipper needs.

I.10 As regards passenger traffic, the key factor for rail is again the density of the flows. Railways can no longer successfully compete with buses, cars and aeroplanes for thin flows. Rapidly increasing concentration of population in urban centers in developing countries and strong evidence of a high propensity to increase travel as incomes rise indicate that increasingly large suburban and inter-urban passenger flows are to be expected. On routes where this traffic is sufficiently dense to warrant improvement in the regularity, reliability and speed of rail services, rail can be expected to have a growing place, at the same time as its share of overall passenger movements is stagnant or declining. A good illustration of this process for a major inter-urban route is Korea in the 1970s. The rail share of passenger movements on the intensely travelled Seoul-Pusan route rose quite steadily from 26% in 1971 to nearly 60% in 1977, while rail's share in overall passenger movements in the country fell from 26 to 25%.

Traffic Potentials

I.11 Planning and managing the development of a railway in face of these major changes in its role is a far more challenging job than it was when railways were in the ascendancy, with little competition from other modes of transport. It requires more imagination and agility than the development of the modes which are now in full expansionary phase. The process of increasing specialization has too often been mistakenly seen as one in which railways passively watch their traffic being gradually pared away by the competition. On the contrary it involves very active initiative by the railways.

I.12 The process of specialization has several dimensions. First, as specialization in terms of the traffics to be carried, it requires constant scrutiny of the particular railway's evolving comparative advantages and active marketing to attract traffics worth encouraging. Second, as specialization within the railways in the form of provision of infrastructure, rolling stock and handling equipment specially adapted to the needs of particular clients, it requires more accurate traffic forecasts than were often needed in the past and sometimes joint investment with these clients. The marketing effort may thus extend to working with a major customer to develop an overall transport plan to handle his goods, sometimes even involving a reform of his whole production and distribution network, integrating railway services with the facilities which he will build. Third, as specialization vis-a-vis other modes which will often carry the same traffic on legs for which railways are less suited, it requires effective coordination of investment and operational activity with those other
modes. Last, as specialization out of those traffics and services in which the railway has no sustainable comparative advantage, it may require active measures to help find alternative solutions for users who will otherwise successfully oppose withdrawal by the railways.

1.13 Little activity can be foreseen for the construction of major new railway lines except in the form of extensions to existing networks to meet major mineral, industrial or natural resource traffic potentials. The principal international railway organization, the Union International des Chemins de Fer (UIC) concluded from a recent survey that, excluding urban and suburban lines, a total of about 10,000 kms -- or less than 1% addition to the existing world network -- is presently in course of construction and that a further 1% addition might actually be made before the year 2000. Several times this amount of new construction is under study in various parts of the world, but the traffic required to make a new line economically viable nowadays is so great -- at least one million net tons, normally -- that actual building is likely to be limited. New high-speed passenger lines, such as are being built in a few parts of Europe and Japan, need extremely high traffic potential, only likely in areas of both high income and very high population density. The Bank's very limited experience with new line building, other than the original Shinkansen and for Brazilian mineral traffic, has not been promising; cost overruns have been considerable, and traffic seldom up to expectations.

1.14 On the other hand there are countries, especially smaller ones, and extensive regions of larger ones, where railways that already exist should in fact be closed or converted to roads. Transport technologies and needs have changed so much over time (and sufficient mistakes were made in earlier railway building) that the mere fact of a railway's existence today provides little or no indication that it should exist tomorrow; the case for maintaining it has to be based on an objective examination of future traffic prospects, taking account of the general trends discussed above. This applies to urban lines as well as to rural branchlines, for if the former carry higher traffic the alternative use value of the railway rights of way, especially as roads, can also be far higher in urban areas; useful conversions of particular stretches of railway to road have been made at relatively low cost in several of the European countries. In the developing countries some small national railways have already been closed. A recent survey in one of the smaller South American countries concluded that all of

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5/ This would be the gross addition. Reductions in the existing network elsewhere could be substantially larger.
the 300 million ton-kms and 350 million passenger-kms still carried on the 3000-kilometer rail network could be carried more efficiently by road. The Bank has played a part in many of these closures and related studies, and has sometimes succeeded in convincing countries not to make planned investments in railways that had no future. Failure to adjust the size of a network to the economy's requirements can lead to the need eventually to close even what might otherwise have been retained.

I.15 Many existing lines, however, do have significant traffic potential, which can be realized by means of better exploitation, and with the aid of supplementary investments smaller than those required for major new line building. To date the most notable success among Bank borrowers in new traffic development has been in respect of inter-city passengers on selected major routes. The railways of Ivory Coast/Upper Volta, Republic of Korea, Malaysia, Spain and Taiwan have all succeeded in stimulating sustained inter-city traffic growth over quite prolonged periods by upgrading passenger services. The above-cited Seoul-Pusan route in Korea is a good example. A new and slightly faster premium express service with air-conditioned cars was introduced in 1970, with relatively small investment (minor track upgrading and the new cars), and progressive improvements were made in the regular express service -- mainly in respect of simplicity of timetables, frequency, and comfort of cars. Railway traffic between the two cities rose from a somewhat low 540,000 passengers in 1971 (when it was depressed by the recent opening of a new parallel expressway) to 4 million in 1978.

I.16 Several borrowing railways have had considerable success in the development of traffic in containers, which generally carry goods in the highly competitive categories of general agricultural and manufactured products. Malaysia, Mexico and Spain are among notable examples. Much of this traffic is normally international trade, and key factors in fostering it are effective coordination between port and railway authorities in providing and operating the facilities for direct off-loading from ships to railway cars of containers requiring significant onward movement (or vice versa in the case of exports) and effective arrangements for pick-up and delivery from/to shipper and consignee.

I.17 Following the advice of consultants hired under a Bank loan, Spain successfully developed a container service for both international and domestic movements. The Spanish railways started their TECO system (Trenes Expresos de Contenedores) in 1974 with service between the capital and the two main port/industrial cities. Bypassing all marshalling yards and running over track that had been improved with the aid of a series of Bank loans, the block trains of containers have been able to operate on faster-than-truck overnight schedules between terminals; distances on the main routes are 500-700 kms. The railways offer pick-up and delivery service at the terminals, using contract truckers. By providing a faster and more reliable service than previously available, TECO has been able to attract substantial business away from trucks, although some of its traffic represents of course transfer from other lower-grade railway services. Despite the relatively depressed state of the Spanish economy in the years when the service was
being introduced, TECO traffic rose from 800,000 tons in the first year to 2,000,000 tons by 1977. Programs of this sort have to be careful to avoid excessive investment in specialized terminal facilities and excessively rapid expansion to serve too many cities, with only light flows between them.

I.18 Another illustrative area in which modern rail technology can help to build traffic is the application of unit trains, sometimes of special-purpose cars, running between dedicated sidings, for carriage of traf

ics in intermediate goods. There has been particularly strong development in these directions in India, Korea and Mexico among the Bank's railway borrowers. An interesting example of how significant such improvements can be, even under highly competitive circumstances, in a traffic group of great importance in most developing countries, is the growth of certain building materials traffic on British Rail. Building materials can often account for 10-20% of total freight movements (all moda

) in developing countries and tend to be among the high-growth types of traffic, so that they are worth special attention. Concentration of cement production in Great Britain in a smaller number of larger plants, and the railways' simultaneous development of methods for transporting bulk cement in tank cars, together opened a new role for British Rail in trainload transport from production plants to regional distribution centers: the railways' cement traffic tripled from 1.6 million tons in 1961 to 4.7 million tons in 1973, reflecting a doubling of rail's share in total cement deliveries in the country. Another growth area for British Rail has been movement of construction aggregates, again mainly in the form of trainloads between production plants and the industry's regional distribution depots. These increases in rail's share of total traffic depended heavily on marketing effort and on joint planning between the railways and their potential customers.

I.19 Thus freight traffic development can be substantially assisted by providing access by direct siding to new industrial areas and to major factories, and by improving other terminal facilities and services. Rearrangement of customers' distribution systems and inventory locations can result in flows of traffic that are sufficiently dense for railways' share to be significantly increased. But equally, great care is needed to avoid installation of sidings and terminals which do not attract sufficient traffic to amortize their costs. Programs in some of the European countries to subsidize such construction may have led to creation of too many of these facilities. Building private sidings will generally only be worthwhile if a certain minimum volume of traffic is guaranteed, while existing sidings and small stations that are underutilized are often better closed and replaced with service by containers delivered by truck.6/

Railways and Energy Issues

I.20 The railways to which the Bank has lent have not generally benefitted so far from any major shift of traffic toward them as a result of the energy problems which began in 1973. If there has been any additional freight traffic, it has rather been in the form of coal as a result of increased production in some countries in reaction to the energy situation. A few railways may have benefitted on the passenger side, due to actual physical shortages of gasoline for road transport and to the pricing and administrative measures that have been taken in a few countries to restrain car ownership and use, and to restrict and discourage domestic aircraft operation. But most railway borrowers have felt higher costs of their own energy inputs more strongly than increased comparative advantage. Their shares of total traffic in their countries, like the shares of the railways in the industrialized countries, have generally continued to fall, as shown for a sample in Table I.2.

I.21 Fuel efficiencies, in railway as in road transport operations, vary enormously depending on factors such as circuitry, empty backhauls, access costs, speed, route conditions and gradients, equipment used, and, most particularly, load factors. Trains presently run range in fuel efficiency from 0.8 kec\(^7\)/ per 100 traffic units, alike for freight and for passengers where conditions are highly suited to rail transport and the operation is very efficiently run, to 20 or more kec per 100 traffic units, which is far in excess of what road transport would normally require, except for single-occupancy cars in very congested urban conditions. To be useful for practical purposes, rail/road comparisons have to be specific, taking account of the volume of people or goods to be moved, frequency required, nature and condition of route, etc.; and they need to allow for the technological and operational improvements in all modes involved that may result from the pressure of higher fuel prices.

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\(^7\) kec means kilograms of coal equivalent, with the following approximate conversion factors: 1 liter of diesel fuel = 1.376 kec, 1 liter of gasoline = 1.240 kec, 1 liter of heavy oil = 1.493 kec, 1 kwh = 0.350-0.420 kec. 0.8 kec/100 ton-kilometers corresponds to about 330 BTU/100 ton-miles. The phrase 'traffic units', as used in the text above, means interchangeably ton-kilometers or passenger-kilometers or the simple sum of both.
<table>
<thead>
<tr>
<th>Year</th>
<th>Fed. Germ. Rep.</th>
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<th>France</th>
<th>Romania</th>
<th>Brazil</th>
<th>Korea</th>
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a/ Inter-city movements only.

b/ Not comparable with figures for other countries because cars are not included in totals.

c/ Not comparable with figures for other countries because own account buses and cars are not included in totals.

Source: National Statistical Offices, Transportation Yearbooks, Railway Annual Reports, World Bank Appraisal and Sector Reports.
I.22 Evidence is beginning to accumulate, however, that the relative rise in the price of energy can significantly increase railways’ marketing opportunities, if the railway will act to take advantage of them. The most significant initial effect may actually be in slightly improving railways’ competitive position vis-a-vis waterways and some coastal/ocean shipping. Ships are normally far more fuel-efficient than railways, while river and canal barges often fall in the same range of fuel efficiency as heavy rail freight operations (say 1-2 kec/100 ton-kilometers). But fuel represents a much larger portion of total costs of waterborne transport than of rail operations, so that large fuel price increases have a much more serious effect on it. There has been, for instance, a significant tendency over recent years for more container and trailer traffic from central and northern Europe to the Middle East to move by rail to southern European ports instead of taking the longer sea voyage from north European ports. It is widely considered that greater reliability of the rail service, more assured delivery times and better handling of freight between ports and railways could increase rail’s share of this traffic substantially further. There is evidence of similar possible developments in connection with some of the bulk freights presently handled by waterway in the United States.

I.23 An interesting recent experiment in marketing of rail services by the Milwaukee Railroad in the United States provides clear evidence of a significant energy advantage to rail on medium-haul movement of trailers, a market in which railways had been relatively unsuccessful in the U.S. It is one of the few publicized cases where a detailed and specific study of comparative energy efficiency under normal commercial operating conditions has been done (by the U.S. Department of Energy). The case shows that on the route involved (some 650 kms from Chicago to the Twin Cities of Minneapolis/St. Paul, with substantial trailer movements) the railway was able, within about six months of starting up the experiment, to reach break-even point on the operation, to attain a 60-80% load factor, to attract a significant part of total trailer traffic (perhaps 20-25%, or around 1000 trailers a week), and to carry the traffic at about one-half the energy expenditure of a trucking company serving the same route: fuel expenditure for the railway alternative (including terminal operations and pick-up and delivery of containers) averaged 2.0 kec/100 revenue ton-kilometers, whereas the trucking company chosen as comparator averaged 3.9 kec/100 revenue ton-kilometers in the same period on the same route. Neither railway nor trucking company had the most modern equipment. The experiment involved replacing a pre-existing single overnight train, carrying trailers along with

other freight with a slightly faster (66 kph average operating speed), much more frequent (three and then four times a day), dedicated service for trailers. Delivery of trailers to consignee was guaranteed within 12 hours of scheduled train arrival, or about 24 hours from their provision at the city of origin. Costs were cut by agreement with labor to reduce manning rates and schedules were organized -- and meticulously applied -- in such a way as to get very high equipment utilization.

I.24 Energy trends may also reinforce rail's comparative advantage on very densely travelled suburban and inter-urban routes. Rail passenger service does not appear to be generally any more energy-efficient than bus service, due to buses' lower horsepower per seat and typically high load factors. Indeed present railway passenger services often show a much lower overall average fuel efficiency than existing bus services. There are still very extensive lightly travelled routes, in developing as in developed countries, where net energy savings could be made by replacing rail services with buses.

I.25 While specifics of terrain, speed, etc., and especially load factor, again have to be examined for each case, it does appear that trains can sometimes have an energy advantage on heavily travelled routes. A Japanese study based on data regarding countrywide commercial bus services in 1972 and actual diesel railcar operation, concluded that diesel railcar service would be more fuel efficient for traffic in excess of 4000 persons per km per day on one section and for traffic in excess of about 160 persons per trip on another. The Bank is now supporting important suburban surface rail improvement projects in Seoul and in one city in Brazil which are expected to be financially viable and to offer useful minor fuel savings. As regards inter-urban services, Korean National Railways brought the fuel efficiency of their highest-grade service on the Seoul-Pusan run to about 0.8 kec/100 passenger-kilometers, whereas buses on the same route are said to reach about 1.4 kec/100 passenger-kilometers, assuming the 95-100% load factors that are realistic for each in Korean circumstances.

I.26 Rising fuel prices may also affect the distribution of traffic between aircraft and railways on densely travelled routes of less than about 500 km, where total trip-time savings from the higher line-haul speeds of

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9/ For instance estimates made a few years ago for Britain, on the basis of 1972 data, showed British Rail's average fuel expenditure per passenger-kilometer to be more than twice that of urban buses and more than three times that of rural or inter-urban buses. D. Maltby, I.G. Monteath and K. A. Lawler, "The UK Surface Passenger Transport Sector: Energy Consumption and Policy Options for Conservation", Energy Policy Vol. 6, No. 4, December 1978.

aircraft are less significant than on longer routes and the disadvantage of aircrafts' relatively very high fuel consumption is exacerbated by the high proportion of take-off and landing operations in the total movement.

1.27 These trends tend to favor fuller exploitation of selected existing lines, with complementary improvement or extension where necessary, rather than major investment in new or greatly improved rail passenger services. Increasing passenger train speeds above the current normal express level of about 120 kph requires not only very substantial investment in track improvement and/or improved cars but also diminishes rail's energy advantage; with existing technology, a 10% increase in speed from this level involves about a 30% increase in fuel expenditure according to French data, and advanced technology does not yet seem to have resolved this problem.

1.28 Thus energy considerations call for both a cautious and an aggressive response from railways and Governments. The caution needs to be maintained against any superficial assumptions that traffic will automatically return to railways as fuel prices rise, without railway efforts to attract the traffic, and against very ambitious schemes for major investment on vague energy-security grounds. Energy is still only one factor in total costs of railways as of other modes of transport, and it has to be considered in an overall economic framework along with the other cost factors. Energy is now typically of the order of 10-15%\(^1\) of total railway costs, compared with about double this proportion for trucking companies using unsubsidized fuel; but the significance of this difference is greatly diminished for many of the shippers who might possibly shift from road to rail since haulage costs are only about half their total distribution costs, and the extra inventories that they would have to carry to make good use of rail service may well have costs outweighing haulage savings.

1.29 The aggression needs to be channelled into: measures to improve the railways' own energy efficiency\(^2\); a redoubled effort at improvement of

\[\text{Up to about 30\% for very heavy unit trains, efficiently run, on steep gradients.}\]

\[\text{Some broad indication of the potential is given by the wide range to be found even in average energy consumption of a number of borrowing railways: from slightly less than 1.5 kec/100 traffic units on Yugoslav Railways to 3.5 on the Sao Paulo State Railways (FEPASA) in Brazil, with Korean National Railways at 1.6 and Congo Railways (CFCO) at 2.4. Data are for 1972 except for Congo (1976). For comparison, average fuel efficiency of U.S. Class I railroads (essentially freight) was about 1.5 kec/100 traffic units in 1976, while that of French Railways (SNCF) in the same year was about 1.9 kec/100 units. Korean National Railways had come down to 1.2 by 1978.}\]
the other dimensions of efficiency, so as to eliminate services that have become even more uneconomic and to enable rail to concentrate on capturing the full potential traffic which it can handle more efficiently than other modes; and active identification, development and marketing of services which energy price trends bring within railways' range of competitiveness. Governments can also do much to put this effort in the right direction, and to support it, by improving road taxation structures, as discussed in Chapter IV.

Conclusions

1.30 Forecasting railway traffic will remain problematic, perhaps particularly so for countries which are growing rapidly so that major changes in economic structure and economic geography are underway. Not only can simple past trends in rail traffic development be very misleading, but part of railway management's job is precisely to break past trends and to adapt to emerging comparative advantages among different transport modes. Sophisticated techniques like regional input-output analysis that the network nature of railway operation calls for are generally far beyond the availabilities of data and skills in the developing countries. The whole issue of improving forecasts has to be approached in a very selective way, according to the significance of the planning or operational decision which would benefit, and the likely magnitude of that benefit.

1.31 Probably the most important step that could be taken in most developing country railways for useful strengthening of forecasting would be to develop stronger customer relations/marketing functions and to link the traffic forecasting responsibility very closely with those functions. Some technically highly proficient railway managements find the idea of active marketing inconsistent with the sense of responsibility to the general public that has motivated many of today's best railwaymen. But marketing need not be at the expense of the public. It represents in fact a reaffirmation, in an era when railways as well as other modes have more alternatives to offer, of the importance of serving the public by adapting and adjusting the service to their needs. Closer contact with the main customers, better understanding of the factors affecting their transport requirements and greater appreciation of the failings they find in railway service and the advantages they see in alternative modes would certainly have helped to avoid some of the more significant errors in past railway traffic forecasts.

1.32 In the best modernized railways the marketing organization is charged with identifying marketable customer services, selling them and achieving agreed revenue targets. Customer research, product design and pricing are all integral parts of the marketing department which also monitors services and demands adherence to service standards by operating departments. Within the marketing organization specific staff are designated
as national managers of product groups, with the responsibility to be thoroughly knowledgeable about the products' handling requirements and to bring this knowledge to bear in designing and pricing services. Salesmen are given specific responsibility for all major customers, such as the approximately 300 which account for 75% of British Railways' freight revenues. Similar arrangements, with marketing staff assigned to become fully familiar with client needs and relevant railway operations, to prepare and negotiate contracts with them, and to supervise execution of the contracts and sort out day-to-day problems have worked well in Mali, for example, for certain major traffics.

I.33 During the necessarily gradual build-up of such a modern marketing organization, it would be reasonable for the customer relations/traffic forecasting staff to carry out studies, perhaps on a five-year cycle (with briefer interim updatings where needed), covering the prospects for all principal commodity groups with potential for railway carriage. Each commodity study would cover the types of issue relevant to that particular category of commodities, as discussed in paras. I.06-I.09. For instance, for steel it might focus on the relevant economic geography, changing transport requirements for different inputs and at the various stages of production, and critical assessment of the schedule for production increases, while for long-distance fruits and vegetables it would concentrate much more on shipper choice issues, the relative qualities of the different modes' services as seen by the shipper, and any possibilities for profitable increase of railway traffic by better adjustment of service. The analysis would never be solely of the line-haul part of the movements required -- a limitation that has underlain much past failure to appreciate the competitive threat of other modes -- but would take a distribution-system perspective considering the roles of the various transport modes and of transport-related services such as storage. The Bank has begun to promote commodity studies of these sorts in recent years, but they are not yet sufficiently seen by railway managements as part of their responsibility; consultants may be needed to help with initial studies, but a permanent capacity should be built up within the railway enterprise.

I.34 This same market research group, again with the help of consultants as necessary, should also undertake periodic passenger studies, focussing particularly on the densely travelled routes, whether suburban or inter-city. With the aid of the railways' costing service, they would re-examine the comparative advantage of rail relative to other modes, organize passenger or household surveys, review regional developments and overall traffic growth, and analyze prospective trends in modal splits. Passenger services often present good opportunity for experimenting with different combinations of service-quality and price. Again permanent marketing staff with specific responsibility for passenger services are needed.
I.35 Marketing staff can still of course be over-optimistic. Some railways have indeed suffered from customers exaggerating their prospective requirements in order to be sure of having available all the capacity that they might need. These tendencies can be reduced by writing contracts in such a way that large customers will bear the costs of their exaggeration and by giving the marketing staff specific revenue targets to achieve, as proposed above; they will then have incentive to investigate and discount their own or their customers' expectations appropriately. Traffic forecasts prepared by operating departments also frequently contain exaggerations since there the natural tendency is to make projections which will justify generous operating budgets. It may be useful therefore to place ultimate responsibility for advising senior management on traffic forecasts, especially of a longer-term nature, with a small central planning staff that will be as neutral as possible and act as a professional critic. Such a group will clearly be in touch with the Government agency responsible for any national development plan but it should be more than a mere mouthpiece for such plans which have so often contributed to excessively optimistic railway traffic forecasts.

I.36 In view of the difficulties of accurate railway traffic forecasting and the tendency to systematic upward bias, there is clearly much to be said for the practice, recently developed in Bank appraisal of railway projects, of carrying out "sensitivity analysis" on the implications of alternative traffic forecasts for the railways' financial performance and projects' economic returns. Such supplementary financial analysis is particularly important in the case of those railway investment projects which are to be financed in important part by internal cash generation or where additional outside funds may be hard to obtain. It is clear from the record of the traffic forecasts in Bank-assisted projects that it would have been better to discount them for purposes of financial planning. Sometimes a good case can be made for basing the capacity plan on a 'best-estimate' traffic forecast erring slightly on the optimistic side, and the financing plan on a somewhat pessimistic view of traffic prospects. But the merits of this depend on the extent to which the railway may realistically be expected to have and to use any 'stretch' capacity for meeting unexpected traffic increases and the costs to the economy of the railways being unable to meet demand; experience shows that some borrowers have not been able to meet unexpected demand effectively and that this has had high costs, so that use of different traffic forecasts for the two purposes could have been advisable. At any rate, whether applied for the main financial analysis or only in sensitivity testing, the pessimistic view should be based not on applying some standard discount factor to the 'best-estimate' forecast, but on the risks pertaining in the particular situation, as they emerge from the abovementioned broad assessment of the overall forecast.

I.37 Finally, to address the crucial and often difficult issue of the long-run role of a railway, especially in cases where the broad assessment of the traffic forecast, comparison with other countries or developments in
other modes raise doubts as to whether the railway is moving in the right direction, it may be worthwhile to organize major studies looking 10 or 20 years ahead. To get away from the pervasive influence of trend analysis, the approach may be taken of first considering alternative possible regional and sectoral economic development patterns and energy scenarios, identifying the main resultant transport requirements in ten/twenty years' time, and sketch-planning optimal transport networks to meet such requirements. The place of railways in such a network may best be identified by examining their possible roles sequentially proceeding from the most assured to the most marginal -- e.g., heavy raw material movements, suburban networks in very large cities, main inter-city passenger services, transport of intermediate goods, container movements, .......... -- in order to build up a correct perspective. The alternative multi-modal plan finally selected as the best, although obviously unlikely to be achieved in all aspects due to unforeseeable needs for adjustment in the interim, would give an invaluable orientation to the overall development of transportation infrastructure in support of broader economic development.
ANNEX-II
RAILWAY MANAGEMENT AND STAFF

II.01 Whether economic realities require that it contract or expand, the success of a railway in contributing to a country's development clearly depends above all on the quality and spirit of its management and staff and the effectiveness with which they organize themselves. This note briefly reviews Bank experience related to the development of railway management and staff.

Management

II.02 In earlier years the Bank gave considerable emphasis to the establishment of legal arrangements to ensure autonomy for borrowing railway entities, under appropriate Boards of Directors. Whatever the legal instruments, such arrangements have not tended to be very effective in practice, except sometimes in reducing purely arbitrary interventions. Few Governments have been prepared quickly to abolish traditional public service responsibilities, to grant complete tariff freedom, to permit large reductions of services or employment, or even to free railway salaries from the overall public service structure. And the railway managements have anyway not been prepared for such gales of derestriction. More useful than broad new railway constitutions have been particular practical steps gradually worked out to steadily increase the railway management's degrees of freedom -- by empowering management to alter allocations within agreed overall budget ceilings, to make payments without Finance Ministry preapprovals on each occasion, to choose contractors and staff without Government directive, to take appropriate disciplinary measures with poorly performing staff, to give bonuses and promotions for exceptionally good performance, to negotiate tailor-made contracts with major shippers and to alter tariffs within certain ranges. Considerable liberalization has been gradually achieved in some cases by measures such as these, and it is absolutely crucial that steady progress be maintained.

II.03 As more powers are given, there is corresponding need for management-level staff to receive increasing training, both in modern techniques of management, to make use of the increased freedoms, and in the modern public service objectives, stressing commercial viability and adjustment of service to customer needs. In some countries salary structures at management level are considered a serious obstacle to recruiting and retaining high-quality senior staff, and to obtaining best results from modern management systems. Elsewhere the continuing prestige of railway work, together with judicious adjustment of outstanding individuals' grades and use of bonus systems, are sufficient to sustain and motivate a good management team. But it often remains difficult to recruit appropriate senior staff from outside the railway's ranks, which is a serious handicap, slowing down the adjustment to new ideas and techniques.
II.04 The value of foreign technical assistance at the management level depends considerably on the ability of the railway to provide adequate counterparts, and of the technical assistants to communicate knowledge relevant to the situation of the railway. Thus some African countries have been able to make good use of increasing numbers of such advisers. But it is also important to give precise and updated terms of reference to these technical assistance groups, and to create effective mechanisms for deciding about and, where appropriate, acting on their recommendations. Also control mechanisms need to be set up for assessing the teams' progress compared with objectives, and for regularly evaluating the performance of the individual members, especially in regard to adaptation of their knowledge to local circumstances and counterpart training. Contracts should normally be for not more than two years, renewable on good results. Assistants provided through consultancy arrangements under Bank loans appear to have been generally of good technical quality, but some countries have complained of other foreign advisers being sometimes insufficiently qualified.

II.05 A vitally important issue in structuring the management of day-to-day operation of a railway system is the degree of centralization which is appropriate. A railway's functioning, quite unlike that of manufacturing industry, consists of thousands of separate actions spread over a wide area and taking place at any time of day or night, but all interdependent. Moreover most of the actions have both a human dimension -- requiring effective contact with a client, say -- and a technical one -- requiring great precision to fit with the rest of the system. Especially with the increasing sophistication and cost of railway equipment and improving communication possibilities, the latter dimension tends to favor increasing centralization of control. On the other hand, the human factor, of relations within the railway and between the railway and its customers, tends to favor continuing decentralization. Various studies in the United States, the one area where it is easy to make such analyses, suggest that the largest railway companies there suffer in fact some diseconomies of scale compared with those of more moderate size (5-20,000 employees): less sense of urgency and responsibility and less individual initiative do occur in the larger organizations with more layers in the vertical hierarchy and a wider spread horizontally.

II.06 Broadly the common tendency in modern railway companies has been to centralize control of wagons and motive power and other common resources increasingly as communication techniques have improved, and to maintain, or even increase, regional responsibilities and degrees of freedom in day-to-day personnel management, purely regional operations and, especially, commercial functions. Most Bank borrowers have been gradually moving toward these directions. For instance, in Latin America, where the job has often been to consolidate pre-existing independent railway companies, central control of rolling stock has been increasing with good results, and in several cases the center of gravity in the regions has been moved upwards to regional directorates at a sufficiently high level to take increased decentralized
responsibilities. Several borrowers in Africa, of much smaller overall size but emerging from a relatively centralized past, have been moving towards delegating more responsibilities regionally, to try to improve human motivation. A particularly interesting form of railway organization, related to general socio-economic structures of the country, is Yugoslavia's highly decentralized system under which so-called Basic Organizations of Associated Labor (BOALs) take responsibility for different aspects of the railways' operations within a region and operate in many ways as separate enterprises, not only with their own accounting but actually buying and selling services from/to other railway BOALs and railway suppliers and customers.

Institution-Building

II.07 The Bank has not normally been very directly involved in advising on these shifts of regional management structure, but it has frequently contributed through financial and technical assistance to the development of improved communication networks and management information systems. These are essential for effective centralized control of common resources and for proper supervision of delegated responsibilities. In several cases the Bank has been connected with the establishment of Data Processing Departments. Progress has been slow, but important improvements have been made.

II.08 The more broadly important effort of the Bank has been to help build up certain central functions, often more concerned with strategic management than day-to-day operational control. Probably the largest impact of the Bank to date at the management level has been in the development of stricter standards of analysis for proposed new investments in the railways, and of planning staff to undertake such analyses. Systematic and persistent emphasis has been given to this area, and progress has been made, even though trained staff often remain too few. The Bank is acknowledged as a major factor in the creation and subsequent development of groups such as the Economic Unit originally started in Indian Railways in 1966, the Planning Unit established in the Taiwan Railway Administration in 1969, the Planning and Organization Office created in Mexican National Railways in 1971 and the Planning and Economic Studies Unit established in the Regie Abidjan-Niger (RAN) in 1978. In several cases investment execution has also been strengthened by appointing coordinating project managers at Bank suggestion.

II.09 Second, the Bank has often given considerable attention to developing the marketing function, and played a substantial part, for instance in Spain, Thailand and Yugoslavia, in the creation or major upgrading of Marketing and Commercial Departments. In Spain the effort eventually led to the creation of an effective nationwide network of 37 sales offices, with responsibility to negotiate services and tariffs (within limits set by headquarters) with shippers on a commission basis and to maintain contact with shippers. Third, the Bank has usually tried to strengthen costing, a function that takes on wholly new importance as a railway moves
toward commercial operation because accurate costing alone can show which traffics are worth pursuing, at what price, and where losses are really occurring. Effective railway costing systems are technically complex and difficult to create, and they are also often resisted by line managers who do not want to have their traditional assumptions and patterns of operation questioned. Another equally important obstacle to their development has been slow reduction in the Government controls -- on tariffs, service closures, etc. -- which inhibit their effective use. Progress has been gradual.

II.10 While useful efforts have been made by the Bank to help improve railway management, and some important successes have been scored, it is hard to avoid the overall conclusion that there is a disproportion between the depth with which this aspect is examined in project preparation and appraisal and the seriousness of management problems as they often manifest themselves during project execution. In recent years the Bank has persuaded some borrowers to commission major management reviews by consultants -- one for a relatively well-organized borrower which has made steady progress in management modernization and where the results of the new study are now being implemented, and another for a borrower that has faced persistent and profound problems and where more radical restructuring alternatives have been examined by the consultants, leading now to establishment of a mining company subsidiary to own separate rolling stock and handle all train operations connected with the mining traffic. Management issues are difficult to handle because they are usually sensitive and because standard prescriptions are not appropriate; successful solutions can only be designed within the culture and traditions of the country. Moreover, reorganizations in themselves are costly and not worth embarking upon unless they will give important results, and they are inevitably slow to fructify even after structure and standards have been changed. In addition, as pointed out, action by the railway has normally to be paralleled by action on the part of the Government to decrease regulation and control of the railway and other transport services. More effort is needed early on in project preparation on management questions.

II.11 Several broader management issues -- less specialized than planning or marketing -- are particularly in need of increased attention. One is recruitment of management staff. Too many railways are reluctant, or unable (for salary, or sometimes labor-union, reasons), to recruit and retain management staff from outside, who could leaven traditional styles and bring in new specialities. Very few borrowing railways have adequate programs to recruit young potential managers with university education, or to identify young existing employees with great promise, and give them special opportunities for experience and training which will put them on the fast track to senior jobs. Excessive proportions of existing management have risen from the ranks and lack the education necessary to make full use of modern managerial techniques.

II.12 Second, more attention should be given to the railway's need for management (as opposed to technical and economic) training at the senior and
middle levels. There is a shortage of good courses specifically oriented to
general railway management and covering subjects like motive power
management, rolling stock maintenance, spare parts management, workshop
productivity, purpose and place of field inspections, conducting personnel
evaluations, raising staff motivation through incentives and punishments,
resolving union problems, assessment of shipper transport needs, principles
and uses of costing, establishment of departmental performance targets and
effective use of periodic control reports, etc. Hence courses of appropriate
coverage may need to be specifically designed for the borrower and given at
its headquarters -- with active, constructive follow-up to the graduated
trainees over the following months, to review the issues they are facing and
discuss how the training material could be applied to help resolve them.

II.13 Third, existing management information systems need systematic
review and evaluation from the managerial perspective, examining the
timeliness and adequacy of the data made available to the different levels of
management and the way in which such data are presently used; this can
provide a uniquely valuable window into any broader management problems, such
as the balance of centralized/decentralized functions, and the need for
reform in that area. Fourth, as compared with the technical information and
indicators which constitute the bulk of most railway management information
systems and serve day-to-day purposes, costing and budgeting data and systems
often need special attention and redoubled effort. Correct costing
information must be more readily available to senior management if
appropriate decisions are to be made in evaluating existing performance, in
choosing among strategic options as to traffics to encourage and discourage,
and in persuading the Government of the importance of giving the railway more
freedom to become efficient. The subject is discussed further in paras.

Staff Development

II.14 The key staff issue is training and it is clear by now that while
the Bank has made valuable contributions in some cases -- by assisting
establishment of railway training institutions, financing training equipment
or covering the costs of overseas training out of loan proceeds -- it has
generally given insufficiently close attention to this area in the past. The
Bank has tended to assume too readily, especially in some African countries,
that large numbers of reliable expatriates would continue to be available and
used, or that on-the-job training could be the full answer. In fact, major
training and retraining efforts, including both course and practical work,
are an essential accompaniment of the large technical changes that have been
underway in railway operations. Many railways' insufficient past effort in
this area is a major factor in their poor technical performance.

II.15 In the French National Railways (SNCF) as much as 3% of total staff
time, spread among some 15-20% of total employees each year, is devoted to
training -- technical and general, on the job or in schools and institutes --
and an additional 0.6% of total staff time is devoted to giving and organizing courses. The Korean National Railway spends 1.3% of total staff time, spread among some 12% of total employees each year, on courses of 2-14 weeks' duration in its own training facilities; substantial additional time is spent on shorter courses and on-the-job training, and senior staff are sent on overseas courses. Indian Railways provide training in their own institutes for some 100,000, or 6% of total staff, each year. Yet when a detailed investigation was finally made three years ago of the situation in an African railway that had long been borrowing from the Bank, where the need for training was undoubtedly greater, it was found that courses being provided covered only about 3% of total staff each year and accounted for less than 0.2% of total staff time; a detailed staff and training survey concluded that the training rate should be immediately increased to about 10% of total staff per year, and appropriate provision was included in the next loan.

II.16 In a few borrowing countries such as Korea and Mexico railway training has now been put on a very sound footing, but in many others special studies are required during preparation of railway projects to inventory existing personnel and skills, identify present and prospective skill shortages (allowing for often inevitable high staff-turnover) and to prepare a phased program of recruitment and training actions to fill the gaps. Such studies can be difficult and time-consuming. For instance, in Cameroon with a total railways staff of some 5,500, they took more than two years and required more than 30 man-months of consultant assistance. The study should therefore be started early, so that results are fully available by the time of project appraisal to allow provision for needed complementary facilities, equipment or trainers out of grant funds or, if necessary, Bank lending. The work must be carried out by people who combine knowledge of railways with a considerable familiarity with local conditions, so as to reach good decisions on the choices that constantly arise between adapting to local conditions and trying to change them. The teaching needs to be carefully phased and integrated with the temporary provision of technical assistance, seriously oriented to working itself out of a job.

II.17 The training needs appear to be so great (typically, at least 10-15% of total staff above the grade of laborer per year), and in significant part specialized, that most railways warrant their own centralized training institution for most trades. For some purposes, regional schools such as those proposed by the Union of African Railways could play a valuable role. In all cases a staff training department, to concentrate responsibility for organizing and promoting all forms of railwaymen's training inside and outside the railway, is needed.

\[1/\] All the cited ratios for Korea and other countries include temporary or 'casual' labor in the denominator and would thus be higher if only permanent employees were considered.
II.18 Manpower planning studies of the type recommended can also help to resolve problems of uncompetitive salaries and inadequate link between salaries and responsibilities. For instance a study undertaken by the Brazilian Federal Railway a few years ago succeeded in securing substantial wage increases for skilled personnel attaining prescribed qualifications, in combination with reduction of total staff members.

II.19 The other principal staff issue which is central to improvement of overall efficiency is reduction of rigidity in work rules and manning rates. This raises difficult social and labor-relations problems, considerably complicated by the fact that railway staff are in some respects a privileged class in many countries, protected by exceptionally strong labor unions. However, without reasonable flexibility in staff assignments, often including gradual reduction in total staff, the benefits of modern railway technology are substantially diminished and the future of railways jeopardised. Manpower studies need to include identification of surplus staff and of methods for redeploying them. A key responsibility of railway management is to convince the labor unions that adjustment is essential to the railways' future and to negotiate out acceptable formulae for progress in this direction. Labor representatives must become contributors interested in the rationalization process and its successful accomplishment.

II.20 Numerous Bank borrowers have in fact been able to make notable progress in reduction of staff numbers. A dramatic case was Spain, where total numbers were reduced by a third from about 125,000 to 83,000 in the first eight years of Bank involvement (1962-70), more than three times the rate of reduction in the preceding eight years. By 1970 labor productivity had increased 130% over 1962, and labor expenses had been brought down by an amount equivalent to about one-third of total operating costs in 1970. After 1970 staff reductions continued but the pace fell to only half that planned, due partly to slower expansion of the Spanish economy and consequent difficulty in absorbing displaced labor in other activities. In Africa many railways have been suffering severely from unnecessary and burdensome inflation of staff but there too a few countries, such as Mali, have succeeded in reducing and containing staff numbers. Railway borrowers' reductions of staff have largely been by attrition, sometimes aided as in Spain by incentives for early retirement, but more use might be made of programs to retrain excess staff for other railway occupations provided their attitudes and aspirations were compatible.
Table III.1

BOLIVIAN RAILWAYS
DEVELOPMENTS UNDER THREE ACTION PLANS
(First Action Plan targets in parentheses)

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<td><strong>Diesel Locos:</strong></td>
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<tr>
<td>Availability (%)</td>
<td>72</td>
<td>45</td>
<td>70</td>
<td>81</td>
<td>72</td>
<td>59</td>
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<tr>
<td>Ave. W.</td>
<td>173</td>
<td>436</td>
<td>402</td>
<td>449</td>
<td>458</td>
<td>306</td>
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<tr>
<td>Daily Run (kms)</td>
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<td>120</td>
<td>197</td>
<td>316</td>
<td>494</td>
<td>221</td>
</tr>
<tr>
<td><strong>Freight Cars:</strong></td>
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<tr>
<td>Availability (%)</td>
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<td>69</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Ave. W.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>20.2</td>
<td>(21.0)</td>
<td>21.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Net Load (tons)</td>
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<td>n.a.</td>
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<td>(17.2)</td>
<td>18.0</td>
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<tr>
<td>Ave. E.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>53</td>
<td>(45)</td>
<td>64</td>
<td>78</td>
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<tr>
<td>Daily Run (kms)</td>
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<td>n.a.</td>
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<td>(70)</td>
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<tr>
<td>Net (kms)</td>
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<td>(650)</td>
<td>748</td>
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<tr>
<td>Ton-Kilometers</td>
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<td>(430)</td>
<td>762</td>
<td>(850)</td>
<td>865</td>
<td>727</td>
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<tr>
<td>Wagon-Day (days)</td>
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<td>n.a.</td>
<td>10.7</td>
<td>(10.9)</td>
<td>11.8</td>
<td>11.9</td>
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<tr>
<td>Turn-around</td>
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<td>11.3</td>
<td>(10.2)</td>
<td>9.6</td>
<td>9.8</td>
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<tr>
<td>Time (days)</td>
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<td>n.a.</td>
<td>10.7</td>
<td>(10.2)</td>
<td>9.2</td>
<td>9.0</td>
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<tr>
<td>Availability (%)</td>
<td>63</td>
<td>85</td>
<td>60</td>
<td>64</td>
<td>67</td>
<td>(70)</td>
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<tr>
<td>No. of Staff (year-end)</td>
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<td>6043</td>
<td>6047</td>
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<td>6116</td>
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<td>Track (km)</td>
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<td>Class Coaches (nos.)</td>
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<td>16</td>
<td>20</td>
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/ W and E refer respectively to the two virtually unconnected sections of the network: the 2100 km Western System in the mountains and the 1200 km Eastern System in the tropical lowlands.

/ Reduction due to large increase in locomotive fleet in 1977-78, combined with low traffic growth in 1978.
deteriorated on the principal, broad-gauge system from 11.8 days in 1965/66 to 13.5 days in 1972/73, increasing about the same over this period as the average length of haul despite favorable changes in traffic composition (for instance, a ton-kilometer of bulk coal requires on average little more than one-third the wagon-capacity needed for a ton-kilometer of general merchandise). Turnaround time further deteriorated in 1973/74 (partly due to large traffic shortfalls) and remained high in 1974/75. Indian Railways drew up plans to bring it down to 13.5-14.0 days in 1975/76 and 13.0-13.5 days in 1976/77, and in both years they came out at the bottom of the targeted ranges. Key factors, which had been worked out beforehand with users, were increased use and improved scheduling of unit trains for bulk commodity movements, particularly coal, and provision of better facilities for loading and unloading coal unit trains. The lower turnaround time was sustained in 1977/78 but deteriorated again thereafter due mainly to serious floods in 1978 and 1979, major coal-mine go-slows and disciplinary problems in railways and major user enterprises. Renewed progress will be needed to catch up with India's Fifth Five-Year Development Plan target of 12.1 days turnaround time.

III.08 The value of Action Plans depends heavily on how seriously they are prepared and taken. Without detailed underlying specification of the steps necessary to reach the targets, and active commitment of railway management to their accomplishment, they cannot play much useful role. They must be highly selective to concentrate effort appropriately and effectively, and they can only be short-term tools. Focus needs to change quite frequently to cope with emerging bottlenecks, and targets are likely to need periodic recalibration to be realistic and meaningful. Recent trends toward greater variety among borrowers and loans in the content of Action Plans, reflecting more specific focus and relying less on standard indicators, are in the right direction.

Motive Power Improvement

III.09 One of the most important and potentially rewarding technological changes through which most of the Bank's borrowing railways have been moving has been replacement of steam with diesel and electric motive power. Even with probable further relative increases in the price of liquid fuels, diesel locomotives remain much more economical for main line operation than steam locomotives, with their far lower haulage capacity, while electric traction is normally more economical than diesel for very heavily trafficked routes. Most existing Bank borrowers have now almost completed the transition out of steam, the largest remaining proportions of steam operation being in India (40% of train kilometers), Burma (27%) and Pakistan (23%). However, in the People's Republic of China steam locomotives still account for some 80% of train operations.

III.10 Nonetheless, in many countries the modern traction methods continue to give rise to severe difficulties. Table III.2 presents a disturbing picture because it shows that, despite considerable past concern about the
problem, the joint efforts of the railways and the Bank have nowhere yet sufficed to bring about a significant sustained improvement in locomotive availability rates, other than possibly in Korea, Taiwan, the Brazilian Federal Railway, and to some extent in Yugoslavia, in all of which cases availabilities were already relatively high. Except on these railways targets for improvement have seldom been met. Most countries in Africa show significant deterioration over the last 10-15 years, and several Latin American railways also fall below 66% availability rates.

III.11 In some countries the situation is really worse than the numbers imply. Availability rates are normally calculated on the basis of workshop returns, so that they fail to reflect breakdowns and outages prior to the time that the locomotive is placed under workshop responsibility. These can amount to substantial additional time, partially explaining why very low availability rates, and consequent shortage of usable haulage capacity, are often accompanied by deteriorating utilization rates of engines recorded as available. Colombian National Railways' indices of 'real availability', for instance, generally indicate a number some 10-12 percentage points below the availability given in the tables: e.g., for 1978, 58%.

III.12 Low locomotive availability has a negative effect on rail services, capacity, traffic and cost. The lower the availability, the higher the stock of locomotives required to carry a given volume of traffic. For example, availability in the range 50-60% implies the need for a stock of locomotives nearly two-thirds larger than if availability were about 90%, which is the lower limit of most continental European or United States railways; with each locomotive (approximately 2000 hp) costing some US$800,000, the extra investment is not insignificant. Even more seriously, significant shortfalls in availability below expected levels often lead to absolute shortage of railway carrying capacity, causing diversion of traffic to more expensive modes, as has happened recently even in several middle-income Asian and Latin American countries, or totally frustrating some traffic, as has occurred in several African countries. Costs to the economy of such unexpected diversion or frustration are particularly high because the capacity that has been provided in all other aspects of railway operations (personnel, track, wagons, etc.) is rendered unusable by the small shortages in haulage capacity. Moreover reliability is important enough for many shippers, that traffic once lost to a railway is often hard to recover. In some cases implementation of project investments such as reballasting has even suffered from shortage of locomotive capacity.

1/ Availability calculations are also sometimes based on different denominators. For instance some companies sometimes exclude locomotives immobilized for more than three months. The figures in Table III.2 are essentially based, however, on the total fleet, as recorded in the assets registers.
## Table III.2

### Trends in Availability Exports for Mainline Locomotives

(with quantitative targets in parentheses)

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**YEARS:** Where borrowers' reporting years are different from calendar years the data are attributed here to the calendar year with which they most overlap, or, in the case of reporting periods ending June 30, to the later year (e.g., 1971/72/73 = 1973).

- **g/ first figure for light diesels and second for heavy.**
- **b/ Broad Gauge system**
- **g/ Standard Gauge system**
III.13 The most important reason for these serious problems has been failure to adjust sufficiently maintenance skills, capacity, procedures, discipline and financing arrangements to the much higher technical requirements of modern traction engines, discussed in the next section. The difficulty of breaking a downward trend in availability results partly from the fact that lags on these scores may be hidden during the early life of new locomotives when maintenance requirements are relatively low and the effects of inadequate preventive maintenance not immediately apparent; quickly catching up later is extremely hard. A related factor with very serious effects on availability in a few countries has been inadequate technical training and discipline among train drivers, leading to improper locomotive operation, breaking of speed limits on poor sections of track, derailments, etc.

III.14 Past experience also shows, however, that great care is required in railways' original selection of locomotives for purchase. Attention is required both to technical aspects such as past performance experience with the model offered and suitability to local conditions, and to price and financing aspects. While the Bank has always stood ready to finance locomotives, lending for them is often available from bilateral credit agencies more easily than for other types of railway investment, with the result that the Bank has been less important in financing its borrowers' locomotive acquisitions than other parts of their programs. With or without Bank involvement, many locomotive purchases have suffered either from poor technical suitability, with consequent availability problems, or from excessive price in the effort to ensure suitability. As an illustration of the latter, excessively narrow specifications in an international bidding a few years ago led one borrower to have to pay a price nearly 300% above the appraisal estimate, and nearly 150% above what was considered a reasonable international price at the time when bids were eventually called and the resultant single bid submitted. Numerous developing country railways have suffered from insufficient stress being given to appropriate technical characteristics of locomotives purchased, exacerbated by a tendency to accumulate over time equipment of many different types of manufacturers, by use of bilateral credit or barter arrangements that appeared attractive from the financial point of view.

III.15 The most successful purchases of locomotives appear to have been based on international bidding against specifications very carefully drawn for the particular railway's circumstances. Depending upon the case, the bids may be required to include financing terms, or the winning bid may be planned from the start to be Bank-financed, or a combination approach may be used, as effectively applied in several instances, where the Bank includes in its loan a provision for locomotives which is automatically cancelled if satisfactory alternative finance becomes available. As regards the technical specifications, which are difficult but not impossible to draw striking a satisfactory balance between technical appropriateness and ability of competing suppliers to bid, the locomotive features which appear to be most
suitable for many Bank borrowers and therefore need consideration in preparing the bidding documents are:

- rugged, on-rail tested, medium-speed (RPM), engines without too high compression ratio, nor too highly supercharged;
- robust, not too complicated, bogies and traction motor drives;
- reasonable overload capacity of auxiliaries with adequate cooling systems for high ambient temperatures;
- air filtration systems not requiring frequent attention under adverse environmental conditions;
- component accessibility for ease of maintenance, especially running maintenance;
- reliability of locomotives proven under track and environmental conditions similar to those in which they are to operate;
- limited range of horsepower for borrower's fleet of mainliners (with multiple operation where needed, e.g., on steep grades);
- adequacy and reliability (and, where relevant, competitiveness) of potential sources of spare parts, and prospects for interchangeability of spares with other or upgraded models of engines/bogies;
- experience regarding quality of maker's after-sales service;
- provision for training of borrower's technicians, supervisors, engineers and instructors in maintenance and operation of the equipment and supply of training aids (cut away/demonstration/simulation models, etc.).

Major locomotive procurements have been successfully made in the last few years based on international competitive bidding with Bank or similar financing (e.g., Egypt, Indonesia) and on international competitive bidding with supplier credit terms (e.g., Ivory Coast, Thailand). A more difficult but potentially rewarding step for several of the small African railways with same gauge and similar conditions would be to pool their locomotive requirements for bidding purposes, so as to make the orders more interesting to more suppliers; some African airlines have taken successful initiatives along these lines in face of somewhat similar problems.

III.16 With the best procurement arrangements and technical specifications, after-sales service remains extremely important for locomotives. The experience is that, even with tried and tested designs, many locomotives show up weaknesses when first introduced into a new environment, and often these weaknesses show a pattern, affecting a particular sub-assembly. The record of service provided by many of the manufacturers at this stage has not been particularly good -- to the point that in a few cases problems identified within a few months of delivery have never been properly rectified. Especially when these problems have affected several borrowers, even if the locomotives were not purchased with its financing, the Bank has occasionally been able to help to a small extent by writing to the manufacturer's head office to draw attention to the problems.
While it is easy to conclude that the Bank should, in retrospect, have advised borrowers to plan fleet additions on the basis of less optimistic projections of equipment availability, the much more important conclusion appears to be that more should, and could, be done about measures to attain reasonable levels of availability. While workshop rationalization and improvement have been an important part of many Bank-assisted projects, they have not often received the emphasis and detailed attention that they seem to need. The locomotive problems appear to have arisen basically either from inadequate workshops, whether in respect of their facilities or their operation, or from failure to ensure a steady flow of appropriate spare parts to the workshops, or both. There are cases where workshops have been declared adequate in one appraisal report, only to be identified as one of the main causes of low equipment availability in the next one.

In many countries the structural adjustment needed in respect of railway workshops applies both to internal procedures and workflow within individual shops, and to the network of different workshops, which are often irrationally located for modern requirements or too numerous. As regards locomotive shops, the problems have often resulted from a failure to conceive of dieselization, when it was started, sufficiently comprehensively; in the interest of economy, or due to constrained budgets, it was decided to make do with small improvements or adjustments to existing workshops, where steam and diesel locomotives would often then be handled alongside one another despite totally different standards and procedures applicable. Modern shops, designed from the start for diesel and electric work, with appropriate specialized equipment and sufficient capacity to cope with expanded fleets, are an overdue need in many countries. More generally, for rolling stock as well as locomotives, the amalgamation of previously separate railway systems, the development of better equipment and modern communications have very often created opportunities for significant economies by concentrating operations in a few strategically located shops and closing many older and smaller ones. Such rationalization has often been unduly delayed, largely for reasons of poor management and partly for social reasons of local job preservation. Many recent Bank loans have included substantial provisions for improvement and re-equipment of selected workshops within a broader rationalization scheme.

Workshop improvements are among the more complex components of railway investment projects. To avoid delays, particularly good coordination and sequencing are required among the various elements involved — acquisition of land for expansion, design and contracting of building, arrangements for training of skilled staff, selection and bidding for equipment, delivery of the various equipment items, ordering and arrival of spare parts for regular operations, technical assistance to advise on layout and workflow and to assist start-up. Workshop components of projects have often suffered from inadequate preparation — such as delays in final decisions on location and design, failure to have specifications and bidding
documents ready by the time of loan approval, and, in some cases, omission of important pieces of equipment. New diesel workshops expected to be completed within three years of loan signature have often in the end taken six years.

III.20 The principal difficulties in workshop operation have been shortage of skilled workers and insufficiently rigid observance of regular preventive maintenance schedules and procedures. Even in face of substantial backlogs of work to be done, many railway workshops in developing countries are forced to work only one shift for lack of skilled staff, or particular equipment models have to wait untended because the individual familiar with them is absent. These problems can only be remedied with larger initial training programs, making more adequate allowance for drop-outs and resignations, and, in some cases, by regrading of staff and introduction of incentive systems. Disciplined planning of maintenance, to adhere to schedules without running into bunching and bottlenecks, and disciplined execution of all prescribed maintenance steps, are crucial. One of the main factors in the gradual increase of locomotive availability rates in Korea has been a large reduction in the share of workshop capacity taken up with unscheduled emergency work; in many African countries such work still accounts for more than 50%, in some cases 70%, of workshop output. Serious deterioration of locomotive availability in some middle-income countries has been largely due to insufficient prior planning to cope with a situation where many locomotives would fall due simultaneously for major overhaul. Recovery from a period of relaxed maintenance standards -- whatever may have been the cause, whether shortage of qualified staff, locomotives or spares -- is often difficult, because unexpected equipment failures tend to mount rapidly. But a thorough inventory of the state of existing rolling stock, especially locomotives, should enable better predictions of maintenance loads and availability rates than have so far normally been made.

III.21 Another aspect of workshop operation which often needs improvement is costing. This is important not only for cost control and identifying steps to increase efficiency of workshop operations themselves, but also for enabling sound decisions as to when equipment should be retired. Many developing countries suffer from inadequate workshop costing systems, and in some cases their locomotive availability rates are exaggeratedly low simply because fleets include models which should already have been retired. In one case looked into recently, for example, it was found that a certain group of locomotives had been costing $200,000 apiece to maintain over each of the past four years (about three times the average for other models, some older) and yielding availability rates of no more than 45%; even though they were only twelve years old, they were clearly totally uneconomic to maintain.

III.22 Equipment maintenance is one of the aspects of railway operation which can be most effectively contracted out, bringing railway management the benefits of competitive prices and reduced administrative burdens, and this solution deserves more frequent consideration wherever any possibility exists. Even if it is more expensive, it may still be worthwhile if quality of work is better and time required less. It is often used in industrialized
countries. For instance the French National Railways (SNCF) contract out all major maintenance of freight wagons among a number of enterprises specialized in such work, and also half of the work on passenger cars, thereby providing a valuable cost control on their own operations which are somewhat more expensive. Among borrowers, the Yugoslav Railways make particularly extensive use of subcontracting, even letting out locomotive overhauls to local enterprises. Particularly where the work can be contracted only to a single firm, the railway should reserve the right to audit contract costs at regular intervals.

III.23 An absolutely critical dimension of railway equipment maintenance which has often caused major problems is the provision of a regular flow of appropriate spare parts. Financial mechanisms to ensure the timely availability of sufficient funds for this purpose are the first essential. Difficulties have arisen with regard to both local funds and foreign exchange, but unavailability of the latter, and especially of the portion for critical locomotive spares, has typically had the most devastating effects. Supplier credit agencies appear to have been reluctant to finance spares, in some cases even going so far as to back up their manufacturers in insisting that credit could be provided for spares for existing equipment only if the borrower bought new equipment at the same time. By contrast, Bank lending in the locomotives category has often been only for spares. More generally the Bank has been wisely liberal in financing spares and materials for rehabilitation, and basic stocks of spares for regular maintenance purposes, even though it normally involves, in part, reserved procurement. But it has not succeeded in dealing with the fundamental problem that many countries face, of establishing a sound domestic mechanism for ensuring that the necessary small amounts of foreign exchange are always channelled to this very high-priority use. The formulae applied in several recent loans, of making Government release of foreign exchange for this purpose an important condition of loan negotiations, or of agreeing on Government provision of matching amounts to loan provisions for the purpose, need to be extended to include firm agreement on the amounts that should be required over the coming years and the ways in which they will be provided. Locomotives in good condition should not require more than $20-25 thousand of spare parts each year, so the sums involved are not very burdensome, but regularity of provision is vital.

III.24 Inventory management is the other aspect of spare parts supply which often needs substantial upgrading, to ensure that the right item is available at the right place at the right time, and at reasonable cost. This is another dimension of the dieselization revolution which tended to get insufficient attention; steam locomotives had relatively few components, most of which could be manufactured by the railways themselves, whereas modern diesel locomotives typically require 3,000-10,000 items per year, making efficient inventory management vastly more important. Modern management methods -- establishing accurate and consistent recording systems, setting firm order-points, focussing special attention on items that are subject to
high turnover or costly, arranging for efficient in-country distribution, etc. -- are particularly necessary, given the variety of requirements (spares are often different even for different models of some locomotive manufacturers) and the very long delivery times that borrowers typically experience. There are cases where time from placing an order with a centralized procurement agency in a developed country until actual delivery to the borrower has been in excess of three years, but a year to eighteen months is frequent experience, and not enough allowance for this has been made in timing the placement of orders.

III.25 Procurement of spare parts can sometimes be significantly improved by using competitive bidding instead of taking the obvious course of returning to the original manufacturer. In a recent case, for example, Pakistan Railways sought competitive bids from a locomotive supplier, original component maker and established spare parts suppliers. The component manufacturer offered prices 20% below the locomotive manufacturer and, more importantly, offered delivery in 12 weeks, as against the 12 months of the locomotive manufacturer. However, some spares are only available from the original supplier of the equipment, and competitive bidding may not be worthwhile for the low-value spares often required in enormous variety.

Line and Service Closures

III.26 As with workshops, but on a much larger scale, extensive networks of lines and services which are no longer economic burden many railways, as pointed out in Chapter II. In some cases it is a matter of individual lines which have lost (or in a few instances never had) the traffic to make them economically viable, while in other cases it is particular types of passenger or freight service which have lost their rationale even though the lines themselves still carry sufficient traffic in other forms to be worth maintaining. Both phenomena can of course coexist in a country. Such lines or services often represent a serious drag on the large management and financial effort needed for rejuvenation of the railway in traffic types and areas where it does have a strong future.

III.27 While the significance of the problem varies considerably among countries, all railway managements need to be continuously on the look-out for operations that they should be seeking to get out of. Recent costing exercises for a range of countries suggest that the avoidable costs of uneconomic lines rarely account for more than a third of the larger operating deficits incurred among Bank borrowers, but that they often represent as much as 5% of total operating costs -- even for railways that are only marginally unprofitable overall. The extent of the problem depends largely on the pace and pattern of change in economic geography since the railway network was laid out, on the degree to which other transport modes have developed and on the railway company's general level of operating efficiency compared with other transport-operators. It is particularly serious in some of the larger countries in each continent. Only very few countries, such as those with a
simple network related to mineral developments that are still in expansion, largely avoid the problem. Even Korean National Railway, with the comparatively rapid traffic growth shown in Annex I, has carried through an important program in the last few years for closing freight services at nearly one-third of its stations.

III.28 The historical experience underlines the importance of steady effort at the necessary reduction of service and disinvestment, because the changes can seldom be brought about rapidly. Several Bank borrowers have made comparatively good progress with reductions of particular types of operation over prolonged periods. For instance, the State Railway of Thailand has steadily reduced its highly unprofitable less-than-carload traffic from around 400,000 tons in 1972 to 135,000 tons in 1979. Mexican National Railways have continued to bring down passenger train kilometers from 16 million in 1972 to 13 million in 1976 — faster than what the Bank thought possible. Daily passenger trains were reduced from 56 to 32, or by more than 40% between 1974 and 1978. The Yugoslav Railways have gradually taken uneconomic lines out of service, eliminating by 1977 some 2,000 kilometers or 16% of the route-mileage that existed in 1965. Without such steady effort, abrupt changes that are likely to be far more costly both socially and financially become eventually necessary; for instance, one Latin American railway cut inter-city passenger-train kilometers by nearly 50%, and total network route-mileage by about 15%, in less than two years, and the studies it has undertaken show very substantial further reductions long overdue.

III.29 The fact that a particular line is not financially profitable, even on an avoidable costs basis, does not necessarily mean that it is uneconomic and should be closed, but it does indicate that the line needs to be subjected to economic analysis. Rough physical criteria of the need for such analysis are annual traffic of less than 400,000 net ton-kilometers of freight per kilometer of the line or less than one million gross ton-kilometers of freight and passenger movements per kilometer; or, for freight stations, annual volume of less than 500 freight-cars. The economic analysis has to compare the costs to society as a whole of alternative courses of action, ranging from keeping the line and the services on it as they are, through carrying existing and prospective traffic at lower service-standards (e.g., reduced frequency of service, closure of some stations, lower staffing or maintenance standards) and possibly transferring some traffic to other modes, to carrying all traffic by other modes following total closure of the rail services. Each alternative will have associated streams of costs — capital (e.g., for upgrading the competing road or providing more buses), renewal, maintenance and operating. The case where the cost would be the total suppression of the traffic if not carried by rail, rather than a modal change, would be rare, although it could arise with, say, a nearly exhausted mine.

More than 40% of the network has traffic density below these levels in the following countries: Argentina, Brazil, Indonesia, Malagasy, Spain and Sudan. Between 25% and 40% of the network falls below these levels in Pakistan and Turkey.
III.30  Not to be forgotten are the costs of the line closure itself (removal of facilities less their re-use value), any changes in the costs of onward movements (or trans-shipment) that would result from closing the particular stretch of rail line, any consequential effects of closure for other neighboring lines, and any reductions in the railway's administrative overhead costs that closure may make possible if the line is significant. A particularly important part of the exercise is to make a thorough examination of future traffic prospects in the area. The alternative showing the lowest net present worth of costs should be chosen — and the steps necessary to achieve it should be actively promoted by the railway. This may involve pressing for the completion of a competing road link, the existence of which is often a precondition of closure, or assisting the start of bus/freight services by a local businessman. In the rare case where economic analysis would demonstrate it to be worthwhile to maintain in operation substantial amounts of unprofitable lines, Government subsidies will be appropriate, to cover the difference between the railway's revenues and avoidable costs.

III.31  Action by the railways and their consultants in carrying through the necessary studies, and by the Governments and their railways in reaching and implementing decisions, has often been disappointing. A few countries with extensive mileages of uneconomic line have taken no action at all on the completed consultant studies, while most of those that have acted have done so more slowly or partially than desirable for the future of the railways; much the same could be said of most of the European countries. The studies, which were often commissioned late, frequently suffered from being too narrowly financial, or from failing to cover an appropriate range of alternatives, or from unconvincing treatment of future traffic potentials. Sometimes the Bank advice appears to have been inappropriate, and in one or two unfortunate cases, particularly in Africa, it is clear that insufficient attention was given to the provision of alternative means of local transport when Governments aid close railway service.

III.32  While the Bank has had some success in convincing national Governments to provide explicit subsidies for unprofitable lines that they wish to see maintained for social or economic reasons, this has seldom succeeded in focussing adequate critical attention on the costs and real necessity of the services. Such subsidies are provided from the national budget, where the costs seem relatively small, for services in particular localities, where the apparent benefits are very large. If, as is the case in many countries, railway passenger fares are heavily subsidized generally while other modes are not, then the people in an area benefitting from special subsidies for unprofitable lines are presented with an even more distorted picture of the costs of rail services compared with other modes.
In face of this sort of problem several European countries, both developed and developing, have moved towards innovative ways of gradually transferring the burden of the subsidies to the regional level, as discussed in Chapter IV. In a few cases, which may be expected to increase with time, this has helped to bring about cost reductions and to generate local support for desirable line and service closures. An interesting approach to reduction of costs of local services that can be appropriate in some circumstances and has been extensively developed in the United States in the last twenty years, is the sale of branch lines to small local 'Short-Line Railroad' companies more representative of local interests, closer to shippers' needs and able to apply staff more flexibly and pay them at lower local wage scales; there are now more than 300 such companies in operation. A few borrowing railways have succeeded in obtaining from local industrial enterprises the subsidies needed to keep a line open, but they do not appear often to have transferred responsibility for operation.

Track Maintenance and Upgrading

III.33 Track works are usually one of the most important investment categories in Bank-assisted railway projects, but they often cause serious implementation problems, and sometimes pose fundamental questions with regard to their economic justification. Track works are typically a combination of, on the one hand, deferred maintenance, restoring the track to its former quality -- for instance by reballasting, resleepering and renewal of the rail itself -- and, on the other hand, upgrading, by installing heavier rail, welding it, or introducing improvements in alignment, to reduce grades and curves. Electrification, which is a major component of a few projects, is in a sense a more substantial form of upgrading.

III.34 Normal track maintenance work in railways is heavily determined by safety and ride considerations. It consists essentially of regular inspection and measurements, levelling and lining operations, spot replacement of defective ties and broken rails, retensioning of rail fastenings, restoring ballast and retamping, cleaning ditches and clearing weeds. The quantum of maintenance work required is heavily affected by traffic volume, speeds, axle-loads and age of track; rail welding, heavier rail, and better alignment reduce maintenance requirements for any given traffic volume. The cost of maintenance work can sometimes be significantly reduced by introduction of modern machinery, provided that labor can be diverted to other users, inside or outside the railway. Maintenance work is generally more cost-effective if carried out on a continual basis, concentrating on spot renewals -- of ballast and formation as well as rails -- at weak points, but the practice that has developed in many countries is to do the work on a deferred basis over long sections. The principal problem faced by most of the Bank's borrowers is extensive mileage of over-age track (and bridges), due to past insufficiency of funds for maintenance and renewals, with the consequence that speed restrictions have had to be imposed at many points.
III.35 Track works appear to need very careful engineering and financial preparation to avoid the problems of delays and/or cost overruns to which they have been subject in almost all Bank-assisted projects; in a few cases there have also been deficiencies in the quality of the completed work. Some of the problems that have arisen in the past could be avoided by insisting upon completion, by the time of loan approval, of detailed engineering needed (i.e., for any substructure works or alignment improvements involved), of bidding documents for supplies and equipment, and of contractor prequalifications in the case where contractors are used to supply materials or to carry out the work. But more attention is also needed to the quality of the basic data used to estimate quantities, and to the effective capacity of the railway or domestic contractors to actually execute the work at the pace planned. In many cases insufficient time has been allowed for necessary training of staff in the use of new equipment, or over-optimistic assumptions have been made about domestic abilities to supply ballast or sleepers. Another difficult planning problem is to arrange the necessary close interdepartmental cooperation to enable the work to be done under operations or, if that is not possible, to allow adequately for the fact that the work can only proceed for a few hours each day. Even with better cost-estimating and planning, unforeseeable uncertainties of weather, international supply and labor go-slows will often cause the work to take somewhat longer than expected. Appropriate financial contingency allowances are therefore needed. It is normally preferable for any Bank assistance to be provided in the form of a percentage of the total cost of the work rather than for procurement of individual inputs (such as rail or ballast or ties), in order to give the Bank more involvement in the actual execution of the work to be done.

III.36 Sound planning of track works is further complicated by the difficulties of properly establishing the economic benefits to the various possible levels of upgrading that may be considered. In principle it should not be very hard to make a proper comparison between the gradual deterioration that would be expected without renewal and the improvements that should result from alternative levels of upgrading: the gains from the latter should be mainly in the form of savings in regular track maintenance expenditures (and from deferral of the need for future renewal, by extending track life), and savings in rolling-stock, locomotive and crew-time requirements as a result of the higher operating speeds (or avoidance of speed restrictions) made possible. Other benefits may be reduced derailments, savings in fuel, lower accidents and shipper insurance claims, use of heavier and more economical locomotives and wagons, and possibly lower costs of rolling stock maintenance. If capacity constraints are present or in prospect, then these benefits may be outweighed by savings from carrying some of the traffic by rail rather than by other modes (or, if the alternative is total frustration of movement, the value of the traffic). However, one difficulty is that the physical relations among these various factors are not well understood in precise quantitative terms, and deterioration rates are not very solidly predictable. Moreover, some of the
potential savings depend on developments and performance in other aspects of the railway operation. And often, insufficiently specific data are available about the physical state and operational performance of the particular sections to be upgraded.

III.37 Thus much judgment is required and, as is to be expected, these judgments appear sometimes to have been wrong in the past. Following various Bank-assisted track renewal projects, train speeds have not increased as expected, apparently due to operational and physical constraints in other aspects of the system (e.g., wagons, bridges, timetables), or derailments have not come down, due to disciplinary problems or rolling stock deficiencies. Yet savings in track maintenance costs, substantial though they often are because of the age of the track being renewed, are very seldom sufficient in themselves to produce a good return to the investment: they may typically amount, in 1980 prices, to some $1,000-2,000 per kilometer of track per year (or about one-third of annual maintenance expenditures per kilometer prior to renewal), compared with an investment cost of some $50-150,000 per kilometer for renewal.

III.38 Track renewals sufficient to raise maximum freight-train running speeds to 60 kph and average speeds up to 40 kph (and maximum passenger-train running speeds to 80 kph), by eliminating sections with severe speed constraints, do not normally present problems of economic justification, provided bridges are included and traffic is well above 1 million gross tons per year. The amount of realignment proposed does need to be carefully scrutinized and in some cases it may well be found best to limit it to elimination of sharply curved sections only, yielding significant benefits in terms of less frequent tyre-turnings of the wagon and locomotive wheels, less frequent rail renewals and reduced derailments, but a slight addition in normal running cost due to extra length of line. For lines carrying less than 1 million gross tons (400,000 net tons) per year even so-called 'essential renewals' require very careful scrutiny, with special attention to the lines' medium- and long-term traffic prospects. The alternative of conversion to a road would often be worth close analysis, considering comparative comprehensive costs -- capital, operating and maintenance. The capital cost of converting to a two-lane gravel road, easily capable of carrying this volume of traffic, might well be less than the costs of restoring the railway to a satisfactory state, even using second-hand rail.

III.39 Even for important lines, carrying much more than 1 million gross tons p.a., improvements to higher standards than those cited in the previous paragraph require thorough consideration of the extent to which other aspects of the railway system will be ready to take full advantage of such standards: generally a joint economic analysis should be undertaken, covering the complementary operational and investment measures needed, and roughly quantifying combined benefits. Such benefits will be mainly of the sort mentioned above, plus those that would accrue in the form of overall transport cost savings to traffic, if any, that can realistically be expected
to be attracted to the railway by the improved service level; particular care is needed to show that such transfer of traffic to the railway is really likely. In these cases of significant upgrading, in particular, it would be worth instituting a much closer follow-up than in the past of the state and performance of the line at the time of analysis and after the investment has been made, so as to help enable more soundly based decisions in the future.

Train Operations

III.40 Changing patterns of demands for railway services and of capacities available for meeting them create a permanent need to better align the one with the other. Past lags in adjustment mean that most railways have potential for substantial operational improvements. Significant cost savings can often be realized within relatively short periods of time, by increasing the intensity with which equipment is used. The need for this has become more important with the growing technical sophistication and hence higher cost of much railway equipment. For instance, the development of more varied types of specially adapted rolling stock, such as tank cars, hopper cars, flat cars, refrigerated cars and container and automobile carriers, in addition to traditional box-cars, has been an important tendency of the last thirty years. Besides cost savings, however, operational improvements can often also result in significant improvements in service quality, as for instance in speed of transit or reliability of schedules, thus attracting traffic which might otherwise choose alternative modes. Relatively small investments in complementary equipment -- for instance, for loading/unloading rail-cars -- or in telecommunications can have major impact, but in many cases operational improvements can also be made by managerial initiative, with little if any investment. Whichever the case, such improvements require persistent pursuit and therefore figure prominently in almost all Action Plans for Bank-assisted projects. Moreover progress in improvements interacts directly with requirements for investment in rolling stock, motive power and eventually track capacity, insofar as greater operating efficiency usually means less equipment is required to carry any given traffic, while lesser efficiency can create shortages of capacity.

III.41 If operational improvements do not require much investment, they often do depend on careful planning ahead, both for the medium term in the form of planning for change and preparing staff and customers for it, and for the short term in the form of tight operations scheduling, usually called 'operational planning'. There are normally various ways to get a fuller use of equipment: tightening the time between jobs, reducing the amount of marshalling required or the time it takes, ensuring heavier loading of wagons or trains, increasing daily hours of operation, raising train speeds, making the service more attractive to customers, etc. Once the potential for any one of these, or a combination of them, has been identified, the measures necessary to achieve them have to be thought through and spelled out: they are likely to be multiple, and ineffective except in combination with one another. Simultaneous changes may be required in allocation of
responsibilities among different departments or units, organizational arrangements, working standards used, labor discipline and time consciousness, union-negotiated labor practices, and the package of services to which customers have been accustomed. The different parties involved have to be carefully prepared if the changes are to be successfully introduced.

III.42 The Spanish National Railway (RENFE) is one borrower that achieved substantial improvement in operational efficiency, and the case of freight wagon utilization is illustrative. In 1974 RENFE was able to carry 50% more freight traffic than ten years before, despite having nearly 40% fewer freight wagons in its fleet, because wagon productivity had risen from about 110,000 ton-kms. p.a. in 1964 to 270,000 in 1974. The most important factor in bringing about this substantial change was a major rationalization, beginning in 1968, of LCL (less-than-car load) traffic which had accounted for more than 20% of freight-train kilometers, with wagons having an average load of only 1.5 tons; by concentration of the service at the stations accounting for the vast majority of this traffic, the share of freight-train kilometers required for it was reduced to 7% by 1972. Second, a centralized system for determining allocations for wagons among stations had been introduced, starting in 1966, with the help of consultants. Third, average freight-train speed had increased about 33% between 1964 and 1974, assisted by rapid dieselization/electrification and extensive track improvement. Fourth, there was considerable application of the unit-train concept for bulk movements and containers, avoiding marshalling yards. Last, RENFE gave great emphasis to marketing from the end of the 1960s, setting up a separate department and empowering it inter alia to offer guaranteed delivery times, with a financial penalty to the railway if they were not met.

III.43 Pakistan Railways' experience with its main line from Karachi to Rawalpindi, which has been a preoccupation for more than a decade, illustrates some of the difficulties which arise. Consultants produced a report in 1971 with some 15 principal recommendations for improving operational efficiency. In 1975 several steps were taken and a major change was introduced with the grouping of faster, passenger trains in batches so as to leave more train paths for slower-moving freight trains. Nonetheless high priority to frequent passenger services, shortage of reliable motive power, low freight-train speeds and poor wagon control limited the positive effects of this measure.

III.44 Late in 1976, at the Bank's advice, the daily number of passenger trains was sharply reduced, with the length of those remaining brought up closer to locomotive capacity; further reductions in numbers were made in the following years, much as agreed with the Bank. However, the slowing of passenger trains by addition of stops at minor stations, under-utilization of locomotive capacity on passenger trains, poor locomotive availability, high rejection rate of freight wagons due to their poor state, slow unloading of wagons and failure to use wagons as efficiently as possible in face of highly unbalanced north-south traffic flows prevented freight services expanding as
much as they could and caused significant traffic diversions to road. Special efforts to improve operations in the winter of 1978-79 by use of more unit and block trains helped to raise freight-train loading and to increase the number of freight trains leaving Karachi to a daily average of 12, better than the 10 of the previous year, but below the 14-15 which was possible and sometimes attained for short periods. Daily mileage of available diesel freight locomotives increased from the 1972-77 range of 110-120 miles to 140 in 1978-79 but remained well below the agreed Action Plan target for that year of 170. Wagon turnaround time improved slightly from the high levels of 1975-77 but remained much in excess of target. Freight-wagon productivity, in ton-kilometers accomplished per year, increased less than 20% between 1972 and 1978.

III.45 The possibility of dramatic operational improvements within short periods of time is perhaps best demonstrated by the case of the Mexican National Railways. Between 1973 and 1978 freight-wagon turnaround time was reduced by about one-third from over 19 days to about 13 days, and average daily ton-kilometers per freight wagon in service was raised by 70% from about 1300 in 1973 to 2215 in 1978, well ahead of the Action Plan target for that year of 2000. A contributory factor to the latter increase was purchase of new larger wagons under the Bank loan, but the much more important causes were improvements in freight-wagon control and greatly increased use of unit and block trains following fixed schedules. By 1977 some 70% of freight ton-kilometers was accounted for by such trains, compared with less than a third in 1975. Foreign consultants helped introduce improved systems for control of motive power and rolling stock. These changes involved little physical investment and were mainly based on stricter planning and scheduling of operations, greater stress on adherence to timetables and to operating instructions, preparation of trains and their documentation well ahead of scheduled departure, and conveyance of information on train consist and state of locomotives, etc., to destination before arrival so as to facilitate expeditious handling. The railways and their consultants also developed plans for greatly improved telecommunications systems which began to be implemented in this period and are expected to bring substantial further operational improvements in coming years.

III.46 These various cases bring out both the complexity and the simplicity of operational improvements. They are complex in that they generally depend on coordinated actions in several areas and a variety of measures in each area; technical consultants, able to apply experience from other countries imaginatively to the problems of their client can be particularly useful in helping plan and implement programs for improvement. They are simple in the sense that it is often more a matter of raising average performance closer to best existing level than of further improving the best level so far attained by the railway. Analysis of a large sample of consignments on one Latin American railway a few years ago, for instance, showed that its problem was not so much long transit times as such but rather the enormous variety and unpredictability of total transit times, with
ratios between normal minimum and normal maximum averaging about 1:3 and reaching 1:5 on several of the main routes analyzed. The increase in average freight-train commercial speed in Mexico (to about 26 kph presently, similar to Spain, but much above Pakistan's 18 kph) has owed more to organization of appropriate traffic into unit trains and stricter timetabling than to improvement of equipment. Reasonable targets need to be set by railway management to orient the improvement effort, but the targets must be backed up by detailed identification of the measures necessary to reach them and by close pursuit to measure progress and to identify and break bottlenecks which had not been foreseen. Partly to help identify the necessary range of measures in sufficient depth, the Bank has been promoting recently the preparation of comprehensive Transport Plans for the most important commodities carried by a borrowing railway.

III.47 Signalling and telecommunications merit special mention for their potential to improve train operations, as well as other dimensions of operating efficiency, and to increase system capacity, at relatively low cost. There is often a tendency, however, for consultants and manufacturers to overdimension proposed investments by jumping stages or in other ways. Major improvements on many lines can be made simply by introduction of tokenless block plus quite simple telecommunication facilities. Thus plans need to cover both signalling and telecommunications -- taking due account, in the latter case, of the possibilities of using circuits on the country's public telecommunications network -- and to separately identify the proposed roles of each. They should compare alternative staged sequences of development in terms of the present worth of costs as well as of net benefits, since benefits are hard to quantify soundly although they can be substantial.
ANNEX IV

FINANCIAL OBJECTIVES FOR RAILWAYS AND
ARGUMENTS FOR SUBSIDIES

IV.01 The basic objective in establishing financial and pricing policies for railways should be to help them carry through as quickly and efficiently as possible the structural change that is essential to their future. Chapter III illustrated some of the difficulty and breadth of the structural change required, and Chapter II demonstrated the need, in the form of the more specialized role that railways are now called upon to play in transport as a result of technological development in other modes. The traffic trend figures assembled for a wide variety of countries in Table I.1 indeed suggest that these technological forces are so inexorable that it might be questioned how much difference railway financial and pricing policies would make. But those broad figures say little or nothing about the pace and cost of the changes accomplished, or about how different types of traffic have been redistributed among modes, or about the efficiency and quality of transport service now being provided in the different countries. Within the broad trends affecting all countries, these are the kinds of issues that will be crucially affected by financial and pricing policies.

IV.02 Financial and pricing targets and policies thus need to be conceived in such a way as to exert continuing pressure on management, staff and customers towards increased efficiency. They should encourage and facilitate the closure of services, stations and lines that are no longer economically competitive with other forms of transport. They should help ensure availability of the wherewithal to properly maintain equipment and track that are still needed and to carry through cost-reducing and traffic-attracting innovations such as the workshop rationalizations and operation and service improvements described in Chapter III. They should help to guide the selection of worthwhile investment projects and to enable such projects to be carried through efficiently without delays resulting from shortage of cash flow. They should serve to attract traffic in which the railway can have continuing comparative advantage, to discourage other traffics, and to encourage management and marketing efforts in these directions.

IV.03 A comparative advantage for the railway in carriage of a particular traffic means that it must be able to offer conditions of service and price such that it can attract and hold the traffic and not lose money on the deal. Losing money means quite simply that additional revenues from carrying the traffic are less than the additional costs involved in carrying it. The appropriate concept of cost is thus marginal costs. Whether they should be long-run, medium-run or short-run will depend on the decision to be made:
provision of service to a new mine, involving construction of an access line and acquisition of additional rolling stock, will clearly not be worthwhile unless prospective revenues are sufficient to cover long-run marginal costs; initiation of a new fast container service involving some line upgrading and purchase of new specialized cars will not be worthwhile unless revenues cover at least medium-run marginal costs; while introduction of discounts for off-peak passengers or backhaul freight will be worthwhile if the net additional revenues that result more than cover short-run marginal costs. The expression 'relevant-run marginal costs' is therefore often used to refer to these various concepts generically. Prices should always be set at short-run marginal costs, investments and services having been sized by the above-discussed decisions so as to equate relevant-run and short-run marginal costs. Supplements to short-run marginal costs that are needed to cover overheads and attain overall financial targets should be concentrated on traffics that are relatively inelastic, so that they will be little diverted.

IV.04 In seeking to identify marginal costs for practical purposes, the first step is to ask realistic questions, about activities (such as those just mentioned) which might be undertaken or abandoned, rather than the theoretical question as to the marginal cost of the last passenger on a train, and suchlike, which bedevilled economic discussion of railways for so long. Fares and rates are not set for 'last passengers' but inevitably in large categories and blocks. Second, it should be noted that the pursuit is of cost causation, of how much costs would be changed by addition or subtraction of a particular block or category of traffic.

IV.05 Third, despite much earlier thought to the contrary, investigation and observation have shown that a line's track and signalling, the costs of which have given rise to the greatest difficulties of allocation among traffics, do in fact get adjusted quite closely to the traffics which they carry, indicating that a high proportion of their cost can in fact be causally attributed; true joint costs, which will not change with the addition or deletion of major categories of traffic, are a relatively small part of total railway costs. Fourth, causation of the costs of track and signalling can best be identified by examining peak-period traffic (in terms of trains handled), which determines the standards provided, and by asking the question what extra costs or savings there would be to the system if a particular category of traffic in that period were added or taken away and other traffics redistributed appropriately. It is the rate of output which is the prime determinant of a railway's costs, not the total annual tonnage carried.

IV.06 The questions to which answers are sought are about the future and the resources that would actually be consumed. Costing systems have of course to be based on data about the past, but they should reflect current or future prices of inputs (and of course quite exclude historical book values
of assets use, and be capable of indicating the marginal costs of carrying a particular additional category or block of traffic when other traffic is as it is expected to be during the currency of the traffic contract under consideration, rather than as it has been in the past. Ideally the costing system would be linked with the general budgeting and cost-control system, such that the costing unit's estimates of the consequences of a change in traffic would reconcile with the estimates of regional managements (and other cost centers) involved, and budget increments or decrements would be provided as the decision was made to carry or to cease carrying the traffic in question. It does take time and positive managerial action to increase and to decrease marginal costs efficiently, and this must be allowed for, but the costing system must not be permitted to be falsified by a failure of managerial follow-up on cost reductions or increases decided.

IV.07 Effective decision-making along the lines described thus requires competence in the railway in marketing, costing and operations management, and close cooperation between all three groups, both centrally and regionally. Marketing staff must have a good appreciation of the needs of existing and potential customers, and good negotiating sense. They need a distribution-system perspective, taking account of storage and intermediate processing as well as movement, and a close understanding of the prices and service qualities of alternative transport modes. They must have a particularly sound knowledge of their railway's costs -- and of the difference that would be made to them by addition (or deletion) of a particular type of service in a particular season or time-of-day. Costing staff must be able to provide the relevant cost data in the necessary detail and accuracy to correspond to decisions needed and to ensure services are not sold below cost. Operations management staff need to be able to identify the scope for cost savings and for service improvements, based on costing and marketing findings, and they must effectively deliver agreed-upon improvements at expected levels of reliability and regularity.

IV.08 What overall financial targets will be most conducive to achievement of this type of pricing system and accomplishment of the accompanying structural change in the railway? Much has been made over the years of the notion that railways, in their retraction phase, are declining-cost industries with substantial spare capacity; hence at the limit, if traffic is very responsive to price and the railway has unlimited spare capacity to carry it, tariffs set at short-run marginal (or variable) cost would not yield revenues sufficient to cover even such fixed portions of working costs as administrative overheads and normal essential maintenance and renewals. Closer study has shown that, even in the case of railways gradually losing traffic overall, a considerable share of track-maintenance cost is in fact traffic-related (as discussed in para. III. 34), congestion points still develop on the system and sharply raise short-term marginal costs, large portions of traffic are little responsive to price (because the railway is substantially superior to alternatives for them) and other portions are much more responsive to service quality (regularity,
reliability, type of wagons, etc.) than to price. Thus properly
discriminatory tariffs, reflecting marginal costs at different points and
times on the network and including higher mark-ups over marginal cost the
less price-elastic the traffic, can yield revenues sufficient to provide
adequate service and cover overheads.

IV.09 Even more important, the principle of overall 'budgetary
equilibrium' for an enterprise — in the sense of requiring it to earn at
least sufficient revenues to pay all working costs, and the interest and
principal due on debt — has now been widely recognized as an invaluable, if
not irreplaceable, tool for ensuring disciplined management and avoiding
laxity in investment decisions, wage negotiations, marketing of services and
day-to-day operations; nothing binds as effectively as the budget
constraint. Economic and administrative principles together therefore imply
that the target operating ratio for a railway not significantly expanding
should be at most 100\% /1/ or a railway needing minor expansion and
modernization of operations, a somewhat lower maximum figure, say 95\% /1/, would
be appropriate, so that funds would be generated to cover additional interest
and provide extra cash-flow for minor re-investment.

IV.10 However, many railways, whether in developing or industrialized
countries, have not been reaching these levels of financial performance.
Little is now heard of the older marginal-cost-pricing justifications, just
discussed, for these departures from budgetary equilibrium. Various other
rationales are given, which will now be discussed and weighed.

Inflation

IV.11 Probably the most important single factor depressing the financial
performance of the Bank's major borrowing railways in the 1970s was been
Government delay in approving tariff increases, since the level of tariff
freedom so far granted nowhere (except in Colombia) permits significant
general increase in tariffs without Government approval. To some extent the
problem has been an administrative one: procedures for preparing and

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1/ Assuming, in both cases, depreciation to have been calculated on
the basis of revalued assets, reflecting the market value of
factors such as land and replacement value of renewable assets.
The specific level of operating ratio which would meet the
budgetary equilibrium requirements specified would of course depend
on the debt structure of the particular railway. In cases where
assets are taken out of operation before the debt incurred for
their purchase has been fully paid off, or where substantial debt
has been undertaken to cover operating losses, capital
restructuring is often necessary to avoid decisions about the
future being distorted by errors of the past.
processing tariff increase requests were too slow for a period of fast inflation. But the larger difficulty has been Government rejection or reduction of requests for tariff increases in the hope that this would help to stem inflation. The principal rationale appears to have been the simple one — that railway tariffs are a significant element, directly and indirectly, in the cost-of-living index, and the railway a leading public enterprise. Hence both direct effects on the cost of living and on publicized indices of inflation and general effects on business psychology were expected to help the anti-inflation battle.

IV.12 Except in the few cases where the reductions, or delays in approval, of tariff increases were held to minor proportions, they have in all cases led to the initiation (or substantial increase) of operating subsidies. Indeed in some cases the revenue foregone as a result of denial of tariff increase requests was from the start to be made up by corresponding compensation payments from the Government budget — a technique extensively used in France where one of the larger items in recent Government assistance to the railways has been specifically on this score (e.g. some US$700 million equivalent in 1978).

IV.13 No studies appear to have been carried out to assess the real effectiveness of delays in railway tariff increases as an anti-inflation weapon. But it is hard to see how they could come to a positive conclusion. Inflation, i.e., the process of continual increases in the general price level, is an economy-wide problem and therefore can only be effectively controlled by economy-wide measures, such as reduced Government spending or increased taxes. Holding railway tariffs down in face of cost inflation is to deal with symptoms not causes; it is a kind of hoodwinking. Delays in approving tariff increases might possibly contribute to slowing inflation, where they were limited to a few months, with a view to avoiding excessive bunching of public service price increases. In practice the delays have been much longer, requiring either much larger tariff increases when decisions were finally taken or, as has occurred more often, growing subsidies that have almost certainly had greater inflationary effect. In reality, therefore, delaying the adjustment of railway tariffs to costs cannot reduce inflation, and it may well reinforce it, mainly depending on its effects on internal railway operating efficiency, on the effects of the below-cost tariffs on the demand for railway services and, most immediately, on how the make-up subsidy is financed. These points are dealt with in the following paragraphs.

IV.14 There is increasing empirical evidence that provision of subsidies to public transport enterprises does in fact easily have the cost-increasing, productivity-reducing effects that would be expected in theory: once the public coffers are open, financial discipline cannot be as effective as it
was before. A recent cross-sectional study\(^2\) of ten European railways in the late 1970s shows a fairly clear negative relationship between labor-productivity and Government financial support: the lower the latter the higher the former. Another more extensive, time-series and cross-section analysis\(^3\) of urban public transport enterprises in some fifteen industrialized countries indicates that at least one-quarter, and often more, of any increase in subsidy can normally be expected to be lost in higher unit costs/lower productivity, due to featherbedding or to weakened resistance to pressures for wage increases.

IV.15 Review of data available in the Bank on the experience of various railways in the 1970s demonstrates clearly that the accessibility of rising subsidies has in a number of cases been connected either with staff costs per employee rising much faster in railways than in industry generally, or with sharp slowdowns and shortfalls in growth of railway labor productivity while wages continued to increase at the rate of the industrial sector generally.\(^4\) A dramatic example of the latter is Spain between 1973 and 1977: while average railway wages increased nearly 50% in real terms, railway labor productivity increased only about 10% (mainly due to shortfalls from plan in discharge of labor, further exacerbated by traffic shortfalls).

IV.16 Significantly greater rates of increase of wages of railways than of other sectors always seem to be connected with rising subsidies. Details of the three cases where available evidence indicates such disproportionate wage increases to have occurred in the 1970s are summarized in Table IV.1, which shows for each railway: first, the gradual build-up of operating subsidies (shown here in U.S. dollar equivalents at current exchange rates); second, the differential, in terms of percentage points, between the real wage increase each year in the railway and in industry generally (significant

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4/ Whatever evidence is available suggests in fact that, equally for contracting as for expanding railways, the rate of increase in industrial wages normally sets the floor, over any significant period, to the rate of increase in railway wages. Failure to allow for railwaymen's participation in this way in general productivity increases in the economy was one of the major failings of the financial projections used in the famous Beeching report that underlay the attempted restructuring of British Railways in the 1960s.
negative figures when subsidies are only starting to build usually reflecting residual railway efforts to contain expenses); and third, the absolute difference (again in U.S. dollar equivalents) between each year's actual wage and salary bill and what that bill would have been had railway wages increased (cumulatively each year since 1969) at the pace of competing employees, represented by the manufacturing wage index. All calculations use actual employment levels in each year, so that the last column reflects simply the effects of the differences in wage levels.

IV.17 Comparison of the figures shown for each year for 'Extra Wage Bill' and for 'Operating Subsidy' suggests that in the railways much more than 25% of incremental subsidies may sometimes go in disproportionate wage increases -- whose effect then takes a long time to wear down even when serious efforts to contain subsidies begin (e.g., Britain after 1975 and Korea after 1977). Since personnel costs normally represent between 45 and 75% of total railway working expenses, disproportionate increase in them has a major effect on overall costs. Moreover, the wage increases themselves add to overall pressure of demand in the economy.

IV.18 There are of course cases where a disproportionately large railway wage increase is required in order to improve the railway's ability to compete for particular grades of labor who are needed for more efficient operation. Since the purpose of the adjustment is therefore to reduce total costs below what they would otherwise have been, the large wage increase should be accomplished without excessive expansion of the total wage-bill, by accompanying it with disciplined contraction of staff in other grades and categories where there is excess. This was successfully carried through, as mentioned in para. 3.15, by the Brazilian Federal Railway. There average real wages on the railway rose almost 90% between 1969 and 1978, but total staff numbers were reduced nearly 30%, so that the total wage-bill rose in real terms only 33% and the overall working ratio improved somewhat between these two years. The railway's labor-productivity increase over the period was far in excess of its real wage increase, unlike in Korea, Spain and Yugoslavia in the periods discussed here.

IV.19 Since railway wages are likely gradually to adjust to whatever level is needed to attract the necessary labor, the more common and important medium-term effect of the availability of increasing subsidies may be in lowering labor-productivity below what it would otherwise have been, as appears to have occurred in Spain after 1973. Negotiating work rule changes with labor unions or selecting staff for discharge are sufficiently discouraging tasks that managements readily relax emphasis on them if there is any way to do so; availability of increasing subsidies often also makes labor unions more recalcitrant.

IV.20 Sometimes the argument is reversed, to say that a railway should not be permitted to raise prices in face of inflation precisely because it has so much scope for internal cost saving by measures such as these. A further step in the same line of reasoning is to claim that active Finance
Table IV.1
Railway Real Wage Increases in excess of the All-Industry Average, and their Link with Growing Operating Subsidies

<table>
<thead>
<tr>
<th>Year</th>
<th>Korean Railways</th>
<th>Yugoslav Railways</th>
<th>British Railways</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operating Subsidy</td>
<td>Real Wage Increase</td>
<td>Extra Wage Bill</td>
</tr>
<tr>
<td></td>
<td>($ mln.)</td>
<td>(%)</td>
<td>($ mln.)</td>
</tr>
<tr>
<td>1970</td>
<td>n.a.</td>
<td>n.a.</td>
<td>176.7</td>
</tr>
<tr>
<td>71</td>
<td>-3.6</td>
<td>-0.9</td>
<td>171.6</td>
</tr>
<tr>
<td>72</td>
<td>1.8</td>
<td>-11.8</td>
<td>337.8</td>
</tr>
<tr>
<td>73</td>
<td>3.8</td>
<td>0.5</td>
<td>407.2</td>
</tr>
<tr>
<td>74</td>
<td>14.0</td>
<td>-6.1</td>
<td>863.9</td>
</tr>
<tr>
<td>1975</td>
<td>29.7</td>
<td>19.2</td>
<td>886.7</td>
</tr>
<tr>
<td>76</td>
<td>28.3</td>
<td>30.4</td>
<td>659.6</td>
</tr>
<tr>
<td>77</td>
<td>44.8</td>
<td>6.0</td>
<td>650.1</td>
</tr>
<tr>
<td>78</td>
<td>44.1</td>
<td>-10.3</td>
<td>n.a.</td>
</tr>
<tr>
<td>79</td>
<td>45.0</td>
<td>3.2</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

211.5 49.0a/ 87.0 770.0 8.0a/ 66.4 4153.6 13.0a/ 693.3

a/ differential for period as a whole, 1970-79 for Korea, 1969-77 for Yugoslavia and Britain.
Ministry involvement through payment of an outright subsidy will further help to reinforce the pressure on management to take these disagreeable measures. The evidence discussed above strongly suggests that Governments, with the political pressures that they face, cannot be as effective in controlling costs as the market — i.e., competition from others in the offer of transport and related services — provided it is allowed to function freely. Moreover, even if the railway might in theory handle the traffic more efficiently than other modes, the national economy will clearly gain from transfer of traffic to modes that in practice are more efficient.

IV.21 The effect of tariff-freezing on the volume of railway traffic thus has a link with its effect on internal railway productivity. Where the freeze is applied particularly to passenger fares, as occurs in some countries, experience would lead one to suppose that the resultant increase in demand for railway services is largely in the form of additional trips that would not otherwise have been made rather than substitutes for trips by other modes. But even if this is not the case, encouraging the use of a mode that costs more to the economy to operate clearly increases overall demand pressure. The only exceptions to such an increase could be the unlikely situations where other modes were more highly subsidized or where the railways have such large excess capacity that the additional traffic could be carried without significant increase in total cost. Thus the final result to be expected would be a further inflationary effect.

IV.22 Sometimes rail tariff controls have been used in more pin-pointed ways to subsidize a particular commodity, for which rail transport is important, on grounds of foreign exchange earnings and savings. In face of inflation, developing countries have, for instance, sometimes held down railway tariffs for domestic coal, to increase its competitiveness with imported oil, or for various heavy export products in periods when their foreign export market was weak. If circumstances are such that the balance of payments effects are positive (instead of the benefits of the subsidy being captured by middlemen), the disadvantage of providing the subsidy through the railway instead of more directly is that it easily leads to cash-flow shortages in the railways, with familiar negative effects on maintenance and minor innovation, and/or to increasing direct subsidization of the railway, with the negative consequences for railway efficiency already described. Adjustment of the foreign exchange rate would normally be a more effective response to the problems described, avoiding distortions that can result from subsidizing a particular product and enabling the economy to find the least expensive way of adapting to a tighter balance of payments situation.

IV.23 The main immediate effect of increased railway subsidies on inflation depends on how they are financed. Since few of the borrowing Governments have a viable domestic market for long-term public debt, there
are few opportunities for borrowing long domestically. The normal sources of finance are therefore, first, an increase in tax revenues or, second, borrowing short-term from the banking system (in the common parlance "printing money"). Increases in taxes, if from households, are likely to result in diminishions of saving and smaller funds available for investment; if from firms (e.g., corporation tax) they are likely to cramp investment, employment and growth of successful profit-making enterprise. The alternative, increase in the money supply, is likely to have both these effects — and in addition it will add directly to the rate of price inflation. The monetization of the deficits of publicly owned industry has been one of the main causes of inflation. The IMF data indicate that support to railways often represents a high proportion of overall Government deficits. Over time there have been many cases similar to that of Yugoslavia between 1973 and 1976, where rapidly rising railway subsidies were obviously a major force in greatly pushing up the overall Government budget deficit from year to year. Support to the railways normally accounted for about half the overall budget deficit; when support to the railways increased much, so did the overall budget deficit. These budget deficits were root causes of the high inflation experienced.

Income Distribution Considerations

IV.24 In the inflationary situation which has characterized most of the world during the 1970s general social considerations have been adduced as arguments for limiting increases in passenger fares, and sometimes in freight-rates for basic necessities. Certain types of passenger services — particularly suburban services, season tickets and 'ordinary' stopping trains — are now subsidized in almost all borrowing countries, out of profits on other passenger and freight services in those railways that are still marginally profitable, and out of Government funds as well for the larger number that are not profitable. The burden of these cross-subsidies and subsidies has often been increasing as the unprofitable services have become a larger portion of the total — as, for instance, with suburban services in India and Brazil. A few borrowing countries, like most of the European countries, subsidize or cross-subsidize almost all passenger services.

IV.25 Unfortunately no studies on the income-distribution effects of railway subsidies have been made in the less developed countries and no data are available on even basic aspects such as where passengers of different railway services fall in the overall income-distribution scale or what is the

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5/ The Government may finance the subsidy by borrowing in the international capital market; but this clearly creates future commitments for tax revenues. It is best to borrow only for productive purposes.

6/ India has recently been initiating significant action to reduce these cross-subsidies.
significance of rail travel in the total consumption of different income-groups. Analyses undertaken in the industrialized countries have raised profound doubts about the income-distribution effects of railway subsidies there. Extensive studies in England, for example, have led to the conclusion that the main beneficiaries of railway passenger subsidies are better-off people and that, when the financing of the subsidies is taken into account, the net effect on income distribution is regressive. Another study, covering Toronto suburban commuter rail service, found the incidence of subsidies to be regressive, such that income was being transferred on average from lower-income to higher-income people. The 1976 report of the Public Transport Study of the Stockholm County Council concluded that public transport subsidies are not, in general, a particularly useful instrument for influencing income distribution.

IV.26 A significant portion of passenger subsidies in the developing countries is in fact going to support uneconomic branch lines and services (such as those of many ordinary stopping trains) which, if systematically analyzed along the lines suggested in Annex III, would turn out to be no longer competitive with alternative existing or potential services by other transport modes. By no means all of the subsidy is then getting through to the passengers supposed to be benefitted, since their needs could be met at least as well (and sometimes better) by other, less expensive means.

IV.27 The most damaging effects of passenger subsidies in developing countries have been in cases where the social argument has been used to keep down the large majority of passenger fares in face of inflation. Pakistan is a case in point: average passenger fares approximately halved during the 1970s in real terms (a rough costing in 1977 indicated that they then covered only about one-third of costs), but passenger trains were always given operational priority, as mentioned at the end of Annex III. While significant commercial freight was lost to the railway mainly as a result of poor-quality service (and to some extent due to high tariffs, increased to partly compensate for losses on passenger operations), rail passenger traffic nonetheless expanded unspectacularly — by less than the rate of population growth between 1966 and 1976. In Korea, by contrast, where average passenger fares were kept high, traffic grew more than 5% a year over the same period. The estimates given in Table I.1 for this period, by the end of which most of the real reduction in Pakistan's passenger fares had occurred, indicate that in Pakistan the railways carried less than 9% of the increase in passenger movements by all modes between these two years, while in Korea the railways took more than 14% of the increase.
IV.28 The secret of Korea's success was in steadily developing various new and upgraded services, both long-distance and suburban, which could attract custom at fully remunerative prices, even while charging prices that were at best barely remunerative (and may have been becoming less so) for certain politically sensitive, traditional services; as a result, such traditional services fell from accounting for more than 80% of the railway's passenger-kilometers in 1971 to less than 30% of a greatly expanded total in 1979.

IV.29 Comparisons of other countries show similar contrasts. Referring to the same 1966-76 period, for instance, passenger traffic grew at 6.5-7.0% annual rates in Taiwan and Mali where tariffs remained generally high and remunerative, but at about the same rate as population in Sudan and even less in Yugoslavia, two countries where passenger tariffs were increasingly inadequate.

IV.30 The particularly widespread and important subsidization of suburban rail services is generally supported by arguments about efficiency of modal distribution, to be taken up in the next section, as well as income distribution. The income-distribution claims have been found severely wanting in various studies of metropolitan areas of industrialized countries, as mentioned. Moreover, there are various second-round effects that could be expected to deprive the poor of at least part of any first-round benefit that they may appear to receive: higher rents for housing close to the subsidized transport facility or lower wages due to the expanded labor market on which city-center employers can draw. (In Paris a special transport tax per employee has been instituted to recover from employers part of the subsidy provided to metropolitan transit). Even broader issues of regional development arise, as to whether subsidized metropolitan transport may not divert growth of manufacturing and trade from smaller towns and rural areas where there are more poor people. These aspects also illustrate the difficulty of quickly eliminating suburban subsidies once they have been allowed to develop; whole structures of employment and residence grow up around them, so that sharp changes would certainly cause political outcries -- though the net effects for the poor would generally be positive.

IV.31 Two measures which could have positive income-distribution effects warrant more attention in developing countries. Both depend on better discrimination among customers. First, passenger fare structures should be developed, reflecting the principles of marginal cost pricing, which include tariffs much above marginal costs for largely captive traffics, such as business passengers and foreign tourists, and tariffs very close to marginal cost for services and passenger categories whose demand is very price-responsive; much has been done in the direction of more refined commercial discrimination, and better categorization of passengers according to demand-elasticity and time-of-travel preferences, by British Railways.
Second, state subsidies, instead of being given in block, can be provided in the form of a supplement for each pass or ticket given or sold to people falling in categories which it is desired to favor; such directly traffic-related subsidies have worked successfully in France (e.g., for large families, invalids, students) and have long accounted for a 20-25% addition to the French railways' total annual passenger revenues. To avoid intermodal distortions it would appear best to offer such facilities, for the favored categories of passenger, on all modes. The difficulty of applying these approaches in many developing countries is of course that the population is much less well documented, but as systems develop in other fields — medical, educational, military, income-supplements, food-entitlements, etc — there is room for imaginative development of both commercial and non-commercial tariff structures that would do much more to benefit the poor than blanket subsidies now justified in their behalf.

**Equalization with Other Transport Modes**

IV.32 A last set of arguments for subsidies, which have been very important in European debates and are increasingly heard in developing countries, all relate to the concept of equalizing the conditions of competition between railways and other transport modes. The idea is that the railways carry various burdens not borne by operators of other modes of transport, and that they must be compensated for these burdens if they are to be able to offer their services at prices which will yield an efficient modal distribution of traffic. It is a question therefore of economic efficiency objectives requiring some adjustments to present financial arrangements in order for the market to produce optimum results.

IV.33 It is important to note that all these arguments, unlike the anti-inflation and income-distribution ones, depend centrally for their validity on the assumption that the traffic affected is responsive to price. If it is not responsive, then the volume of traffic using the railway as opposed to other modes would not be significantly affected by the subsidies proposed, and the resultant modal distribution would not be more efficient. It may be a question of cross-elasticity with other modes or, occasionally, of the elasticity of demand for movement as such.

IV.34 The most important group of arguments relating to equalization of competition concern principally road/rail choices. It is pointed out that road vehicles, especially when moving in towns, seldom pay for the external costs they cause, especially congestion, and noise and air pollution, whereas the railways' congestion costs are necessarily internalized, and their noise and air pollution are normally comparatively limited; this is an argument particularly relevant to competition between cars and suburban rail passenger services. Second, it is claimed that, whereas the railways have to pay all their own infrastructure costs (capital charges on construction, plus
maintenance and renewals) heavy trucks are not making a fair contribution to the costs of highway infrastructure, as demonstrated by studies in many countries\(^7\); moreover their contribution is often decreasing since most road taxes are established in absolute terms and rarely adjusted while inflation is continuous. This argument would apply in principle with even greater force to many developing countries where taxation of trucks is even lighter and probably inadequate to cover even the costs of the damage that they do to the highway pavement, let alone the congestion and pollution they cause. A further consideration relevant to both cars and trucks is that, to the extent they consume more energy than an efficient railway operation, energy savings might be made by enabling the railway to lower its prices and attract more traffic.

IV.35 The obvious, but very important, answer to all these points is that the highway house itself should first be put in order rather than trying to compensate for its deficiencies by tinkering with railways. In other words, to the extent that these claims of implicit subsidization of road transport are true in a particular situation, the solution is to introduce charges, taxes and traffic regulations that will make clear to the vehicle-owner the costs to society of using that vehicle: e.g. parking charges and taxes; area licensing schemes; more adequate bridge and tunnel tolls; 'black box' taxing systems for moving vehicles; restrictions on parking; reservation of bus lanes; ad valorem instead of specific nominal taxes on fuel; axle load taxes and diesel fuel taxes related to the damage done by heavy vehicles; adequate fixed taxes to recover the desired portion\(^8\) of the costs of highway

\(^7\) Largely the same applies to river craft and barges, and the costs of waterway infrastructure, and so the considerations in the text would apply equally to them where they are in competition with railways.

\(^8\) It is normally nowadays considered desirable in principle to recover from road users full costs of the highway network, including all costs of maintenance, administration and renewals and a charge for capital costs either in the form of the year's construction expenditures or in the form of capital charges on the cumulative investment made in the network. The majority of these costs which do not change with use of the highways are normally distributed among vehicle categories according to vehicle-kilometers or gross ton-kilometers for which they are responsible, but the crucial economic point is that these costs should be charged in a fixed form (e.g., annual licenses) rather than in such a way as to affect actual use of the highways. The tax for the latter (normally mainly in the form of the tax on fuel) should be limited to covering the cost to society of such use, i.e., damage to the road and additions to congestion and pollution, quantities which cannot yet be calculated with great precision but can be reasonably approximated.
infrastructure from highway users; and proper reflection of the scarcity value of fuel and foreign exchange, and of national security considerations, in the retail price of fuel. While there are technical difficulties—for instance in adequate taxation of diesel fuel due to the importance of its use for agricultural and other purposes where no highway costs are involved—and heavy needs for elaborate political preparation to overcome the opposition of vested interests in trucking or cheap fuel, there is no doubt that in most countries a great amount could and should be done in these directions.

IV.36 But the question is whether, in view of the political difficulties of bringing about these desirable measures, addition of a subsidy to the railway to balance existing implicit subsidies to road users can have the desired effect of improving inter-modal traffic distribution. Ex-post evaluations of the railway subsidies provided in the European countries on these grounds are rare compared with ex-ante rationalizations, but the evidence available suggests that the experience has not been promising. To the extent that subsidies to urban mass-transit have reduced transit prices and thus got through to the consumer, they appear principally to have generated more transit trips by people who would otherwise have walked or bicycled or not gone out at all, and to have been relatively unsuccessful in reducing the number of cars using the city streets.

IV.37 As regards long-distance haulage of freight, the tendency on both sides of the Atlantic appears to be increasingly to believe that price adjustments of the order of magnitude implied would hardly make a significant difference to the overall balance of road/rail use, modal distribution being much more dependent on the service requirements of different types of traffic and the quality of service offered by the competing modes; \(^9\) an additional factor is that road transport, even if undertaxed, is still in some countries overregulated, such that, if route licensing and controls on numbers of vehicles, etc., were reduced, as they should be, this might well sufficiently improve road service quality as to offset or more than offset the effect of any subsidy to the railway to compensate for undertaxing. Thus it is not clear that such compensating subsidies do, or would, in fact produce a more efficient modal split. And they certainly do generate some undesirable side

\(^9\) A recent official study in Yugoslavia, where great emphasis had been placed by the railways on the "heavy truck" justification for railway subsidies, suggested, on the basis of detailed analysis of 1978/79 data, that the costs of heavy truck operation would increase about 12% if undertaxation were eliminated. This was small compared with subsidies to the railways in the same year, amounting to an average of 25% over all their costs.
effects in the form of uneconomic trips as well as distortions in industrial location decisions and regional development patterns of the type referred to in paragraph IV.30 above.

IV.38 An entirely different type of argument from those discussed above relates to certain budgetary items which tend to be high for railways compared with transport operators in other modes, particularly staff benefits and pension costs. Two points are made: first, that railway staff benefits and pension arrangements are often more attractive and costly than those provided by other employers (for instance in the trucking industry), or paid for by them in the form of social security contributions, etc.; and second, that due to substantial reductions of staff over the years, railways often have an unusually large burden of retirement and pension payments relative to the number of active staff.

IV.39 In several European countries state support for these budget items reaches very large amounts. For example, the French Government's contribution to the railways' pension obligations was $1 billion equivalent, or nearly 40% of the railways' total personnel costs, in 1977, being the difference between the payments due from the railways under their unfunded pension plan and the approximate amount which they would have paid on their existing staff under current French social security legislation; the large size of the subsidy results principally from the great reduction in number of employees over the past thirty years and the fact that railway employees are entitled to retire with full pension 10-15 years earlier than under the general social security scheme.

IV.40 Some of the Bank's borrowing railways also carry exceptionally large obligations on account of pensions and staff benefits, and, for lack of funds to pay retirement benefits or pensions, a few have had to keep on for many years staff who should have been retired. It is clear in retrospect that this problem should have received greater attention in several cases in project preparation and appraisal. Whenever structural transformation requires substantial reduction of personnel, financial arrangements need to be made to enable the reduction to be carried through without leaving the railway a continuing major burden of expenditures irrelevant to present decisions by either railway management or customers on their use of the facilities retained; this does not necessarily mean that the state has to take over vast obligations, if satisfactory incentives can be provided to the retirees to find new employments. On the other hand, it is hard to see justification for any special state contribution to benefits for current employees. Whether or not these benefits (e.g., health, medical, education, welfare, housing as well as pensions) are better than those of other employers, they are part of the cost of continuing to run the railway, and
the railway should earn enough to cover them, or else retract further to permit more efficient suppliers of transport services to take over.

IV.41 Lightly trafficked branch lines which economic analysis shows it to be worthwhile to keep open for a few more years, pending the time when major renewal would be required or a parallel road will be completed, represent a special case of the argument for subsidies to help achieve a more efficient modal split. A specific subsidy to cover the difference between avoidable costs to the railway, negotiated down to the minimum essential level, and maximum feasible revenue, by raising tariffs as close as possible to avoidable costs, may be justified during the limited period that it is worth keeping the line or service open, as discussed in para. III.30. In practice, however, many subsidies and cross-subsidies presently provided on this score tend to be rather for lines that it would be more efficient to close down and replace with road transport; such subsidization is an expensive way of addressing income-distribution and social objectives, as already pointed out.

IV.42 While these several arguments for subsidies to enable attainment of a more efficient modal distribution of traffic have varying degrees of validity — strongest in the case of pension arrangements for excess employees — a further reservation must be entered as to how far such state support will in fact affect modal split in developing country conditions. It was already indicated that doubts have arisen about the sensitivity of urban car and interurban truck traffic to rail subsidies in industrialized countries. The general evidence from the Bank's project experience is to raise even more doubt about the price-elasticity of railway traffic in developing countries. Railway authorities, in arguing for Government support, often tend to see their traffic as price-elastic but, to the extent they are correct, the tariff increase which appears to drive certain traffic away may in fact be much more the event which causes the shipper to re-examine his transport arrangements and discover that alternative modes have developed in the meantime to the level where they can offer him a better service taking all things into account; in other words, the traffic would have been lost to the railway anyway around that time. Subsidies cannot help to retain such traffic for long, nor should they.

IV.43 Presumably mainly because the developing countries are generally sailing much closer to supply constraints in transport, the general impression is of lower price-elasticity, in a global sense, for railway traffic than in industrialized countries — and possibly greater elasticity to service-quality changes, in view of the very poor level of service often provided. Attempts to relate borrowing countries' over-all growth in railway traffic over the last ten years to changes in tariffs reveal no systematic
pattern, but it is certainly true that several of the largest growths occur in countries with the least tariff reductions, and this phenomenon persists when traffic growth is deflated by GDP growth; in other words, some of the countries where railways have done best in terms of traffic expansion relative to overall economic growth have been countries where railway tariffs have fallen least or slightly increased in real terms, and a few of those where they have done worst have been countries where railway tariffs fell most. This must be recognized, however, as reflecting, not purely demand in a situation of readily available supply from railways and other modes, but rather the combined effects of demand and supply.

The Scope for Efficient Subsidies

IV.44 The arguments and rationalizations that have been developed over the years to justify railway subsidies do not generally stand up to close scrutiny, as the preceding pages show. Railway subsidies do not appear to be very effective in reaching their avowed objectives, of countering inflation, improving income-distribution and securing a more efficient distribution of traffic among modes. Alternative measures would be much more effective. Moreover, except in the form of one-time assistance on particular issues such as reduction of staff or closure of uneconomic lines, they appear unhelpful to the task of structural change and easily inconsistent with the discipline so essential to successful management of railways. The latter point was specifically illustrated in regard to labor productivity and wage issues, but it applies equally in other areas. Availability of subsidies reduces the pressure for measures to cut costs and attract customers by operational improvements, leaves management much less protected against demands from particular regions or customers for special concessions, discourages a strict approach to disinvestment and investment, and weakens the image and morale of the railway enterprise.

IV.45 While the discussion has concentrated entirely on the potential benefits of subsidies to railways, the transport sector and users of transport, account must also be taken of the other side of the coin, generally forgotten in railway debates, in the form of important costs to society as a whole. If the necessary funds are raised in the form of additional taxes, then there are the collection costs involved, not likely to be less than 15-20% of the sum raised. If they are diverted from Government programs in other areas, then the costs involved are the benefits foregone by cutting back such programs. That those costs are considerable is partly reflected by the difficulty that many developing country Governments have in actually coming up with the funds promised to the railways. These delays in turn hamper efficient railway operation and project execution, further adding to the desirability of avoiding dependence on Government. Yet once dependence has started, the vested interests in state support grow rapidly and it becomes increasingly difficult to control the situation, as evidenced by the experience of some of the European countries.
Thus, even if some case could be made for subsidies — for a few uneconomic lines or to make up certain fares that are more concessionary than would be justified on purely commercial grounds — it is best to avoid entering a subsidized regime, if at all possible. Given the limited price-elasticity of many traffics, carrying certain burdens of this sort need not be incompatible with overall financial viability and efficient modal distribution of traffic. This has essentially been the philosophy in India in the past, although the railway has also benefitted there substantially from restricted development of the other modes of transport.

Today, however, the more frequent situation among the Bank's borrowers is different. Sometimes it is one where the social and political forces that underlie railway subsidies in Europe have already built up considerable strength. In other cases, the burdens resulting from past failure to cut back the railway system, to maintain the important parts of it and to move tariffs up in line with costs have reached the point that denial of subsidy would deprive the railway of the financial flexibility essential for structural change or require tariff increases sufficiently large that they might deter traffic in which the railway should have a long-run comparative advantage. Indeed in some cases provision of subsidy may even have been denied too long, with the consequence that too little funds have been available for track maintenance and equipment renewals in those traffic categories where the railway could have a marked comparative advantage.

In these situations, where subsidies are really a starting point, the need is to organize or re-organize the subsidy arrangements in such a way as to assist and expedite the process of structural change. Subsidies which, in effect, simply cover whatever deficit emerges at the end of an accounting period are most destructive of financial discipline and least consistent with the objective of structural change. Subsidies which sustain low tariffs as an anti-inflation measure may merely delay the emergence of other more efficient transport solutions for particular traffics. Extreme cross-subsidies, supporting extensive pricing below marginal costs on some traffics while other traffics are grossly over-charged can have equally negative effects on the efficiency of the transport sector.

Subsidies, or such extensive cross-subsidies, should therefore be closely linked with the particular problems which are supposed to justify them and with programs agreed between Government and railway for overcoming or reducing those problems. Closing of an issue at one step, as can often be done in the matter of retirement benefits for excess personnel, is best, because it reduces the danger of subsequent re-opening of the issue and extensions to subsidization. But this is frequently not possible. However, subsidies related to the operation of uneconomic lines and services can be based on specific cost calculations and programs for the gradual elimination of such lines and services over the forthcoming years. Subsidies and
extensive cross-subsidies grounded on backlogs in adjustment to inflation and undertaxation of trucks equally need to be based on specific calculations and on programs of action, largely by the Government in this case, for gradually eliminating the justification. Subsidies justified on grounds of offering low fares to the poor, and meeting social and economic needs of metropolitan areas, should also be based on studies and quantification, and linked with efforts to improve their cost-effectiveness and reduce their burden. Governments which find themselves in the position of having to provide subsidies should also obviously be closely interested in other measures that the railways are taking to reduce costs and attract more commercial traffic. Programs in these areas may therefore also form part of the overall agreement regarding Government support, particularly of course if, as is often the case, the Government has to contribute additional equity capital to pay for some of the related investments.

IV.50 The Bank itself has put considerable emphasis on detailed cost-reduction programs and on the need to link subsidies with the economic or social argument for them, particularly in the case of uneconomic lines and services. It has had a certain amount of success in persuading borrowers to undertake the necessary studies and Governments to pay the sums warranted in cases where they desired that the line or service should be retained in operation. Subsidies rationalized on other bases, such as urban and inter-urban modal split, income distribution and inflation, have not been studied and documented by borrowers to the same extent. It would appear highly desirable for Governments and railways to assess for themselves whether such rationales are well founded in their particular circumstances and to discover ways to make the subsidies more cost-effective. Financial performance targets now agreed on the basis of projected cost reduction and traffic growth could be more convincing with the intellectual backing of studies analyzing the rationale for subsidies and means for reducing them.

IV.51 An interesting approach to making subsidies more cost-effective, and hopefully reducing them, in cases where they concern particular localities, is to give the localities themselves much greater responsibility for them. This applies principally to subsidies for branch lines and for suburban services. In some cases it may be desirable for the central Government to place at the disposal of the local authorities the amount of subsidy that it has been providing each year, and to leave it to them to choose between the rail services and alternative modes of transport; the local authorities will then make necessary payments for the level of service they agree to 'buy' from the railway. Alternatively, a sharing of the responsibility between central Government and local authorities may make for a more effective solution of the problem, bringing more expertise to negotiations with the railways than the local authorities can afford on their own and allowing both sides to consider any systemwide implications of changes in service levels. In either case it should be possible for the
central Government to reduce its financial contribution over time, giving the locality a greater direct interest.

IV.52 Stockholm, several cities in England and some in France now have considerable responsibility for negotiating with the national railways about the level of railway service in their area, fares to be levied and the make-up subsidy to be provided. Some similar initiatives have been taken for dealing with branch lines, as for instance under the United States "Four R" (Railroad Revitalization and Regulatory Reform) Act of 1976 (PL94-210). Yugoslavia has developed a very interesting system over the last few years for fully decentralizing responsibility for payment of rail subsidies to "Communities of Interest" representing local institutions and major railway users in the locality; these groups negotiate the level of service to be provided and decide how the necessary subsidy is to be obtained, the intention being that it would have increasingly to be raised among themselves. Because of the cost-plus nature of such contracts between the railway and the payers of subsidy it is important to incorporate incentives for efficiency gains. This is usually best done by allowing the railway to keep any savings that it can make by more efficient working (as opposed to service quality reduction) during the currency of the contract. Proper negotiation will transfer the savings to the providers of the subsidy when the contract is renegotiated.